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HALL, GIRLS' LATIN SCHOOL.

PEABODY & STEARNS, MAGINNIS, WALSH & SULLIVAN, COOLIDGE & CARLSON, Architects.

STUDY HALL, NORMAL SCHOOL.

PEABODY & STEARNS, MAGINNIS, WALSH & SULLIVAN, COOLIDGE & CARLSON, Architects.

THE ANNUAL REPORT OF THE SCHOOLHOUSE DEPARTMENT

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REPORT OF THE COMMISSIONERS.

APPENDICES.

BUILDINGS IN CHARGE OF SCHOOLHOUSE DEPARTMENT.

Number of Permanent School Buildings in charge of this Department	229
Of the above, there are in use as storehouses, etc. . .	2
Number of Portable Buildings	96
Number of Hired Buildings	18
Giving Class-rooms to the number of	44
Number of New Buildings finished by Commission (including Addition to Francis Parkman Schoolhouse) . .	27
Number Buildings under construction at the present time	2

DESCRIPTIVE SCHEDULE OF PERMANENT SCHOOL BUILDINGS.

Date of Completion.	Name.	District.	Architect.	Description.	Location of Lot.	Area of Lot.	Cost of Lot.	Area of Building.	Cubical Contents of Building.	Cost of Building.	Cost per Cubic Foot.	Rated No. of Pupils.	Cost per Pupil.
1870	Aaron Davis, 12 Rooms P.	Dearborn	Charles A. Cummings	2d Class, 3 Stories	Yeoman st., Rox.	18,200	$17,100 00	5,090		$44,872 62		600	$74 79
[illegible]	Abby W. May, 6 " P.	Dillaway	E. M. Wheelwright	2d " 2 "	Thornton st., Rox.	11,052	8,845 96	4,510	105,015	41,080 08	$0 31	300	136 87
1911	Abraham Lincoln, 40 " G.	Abraham Lincoln	A. W. Longfellow	1st " 4 "	Fayette st.	44,413		17,770	1,158,803	280,055 43	0 24	1,820	153 89
[illegible]	Abram E. Cutter, 4 " P.	Prescott	George A. Clough	2d " 2 "	Medford st., Chas.	12,112		2,500	101,280	12,972 44	0 13	200	64 86
[illegible]	Adams-street, 2 Rooms P.	Gilbert Stuart		2d " 2 "	Adams st., Dor.	44,555		1,570				100	
[illegible]	Agassiz, 14 " G.	Agassiz	E. M. Wheelwright	2d " 3 "	Brewer st., J. P.	42,344		9,651	641,856	99,184 23	0 15	700	141 69
[illegible]	Albert Palmer, 6 " P.	Dearborn	E. M. Wheelwright	2d " 2 "	Eustis st., Rox.	16,165		4,731	212,016	45,300 00	0 21	300	151 07
[illegible]	Amos Webster, 2 " P.	Elihu Greenwood	Fred A. Hall	3d " 1 Story	Hilton st., H. P.	11,280	3,404 79	2,955	95,504	7,093 04	0 08	100	70 93
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

NOTES.

G — Elementary, higher grades. P — Elementary, lower grades. K — Kindergarten. M — Manual Training. S — Special.

The cost of buildings does not include the architect's commission.

The cost of the buildings erected between 1875 and 1894 taken from City Architect's Report, 1894.

In nearly all of these buildings there were additional charges for carpentry and painting covering items now included in the contract for building, such as bookcases, fittings of cookery and manual training rooms, telephones, electric fixtures, the painting and tinting of walls, etc.

Previous to 1909 in counting rooms only class-rooms are taken, and pupils are averaged at fifty to a room; since 1909, rated number of pupils and cost per pupil are figured by actual seating capacity of building according to size of class-rooms.

1 The cost of this building includes cost of repairing adjoining property.
2 This cost includes cost of building.
3 Nine-room addition, 1910, Schoolhouse Department, Architects.
4 Addition built in 1899, Public Buildings Department, Architects.
5 Grading, 1897, 1898, 1899, $6,772.09.
6 This cost includes cost of Public Latin.
7 Remodelled in 1872.
8 Remodelled in 1889, Charles A. Cummings, Architect.
9 Cookery School.
10 Cost of work benches and other equipment not included.
11 Two-room addition built, 1897, $11,744.24 — $241.25 for grading.
12 Cost of land and building included in cost of English High.
13 Includes three kindergarten rooms. Five class-rooms, manual training room and assembly hall added, 1913, Maginnis & Walsh, Architects.
14 Addition built, 1902, Wales & Holt, Architects.
15 Addition built in 1885, E. M. Wheelwright, Architect.
16 Each room accommodates forty-four pupils.
17 This cost includes $7,183.15 expended as an extra on increased depth of foundation necessitated by the condition of the site.
18 Piles driven to support foundation.
19 Three rooms, assembly hall and gymnasium added, 1913, James E. McLaughlin, Architect.
20 Four-room addition built in 1904 and six-room addition built in 1908, C. H. Perkins, Architect.
21 Addition built in 1893, Andrews, Jacques & Rantoul, Architects.
22 Used as storehouse.
23 Includes cooking room and manual training room in basement.
24 Alterations made in original school, 1908, $22,073.40, Wheelwright & Haven, Architects. Addition, containing thirty-three rooms and assembly hall, built in 1908, $433,239.95, Wheelwright & Haven, Architects.
25 Three rooms added in 1904 and three rooms in 1908.
26 Eighteen-room addition, 1910, Hartwell, Richardson & Driver, Architects.
27 Mill construction.
28 Occupied by High School of Commerce.
29 Eight-room addition, 1909, C. Howard Walker, Architect.
30 One-half used as High School of Commerce.
31 Two-room addition built in 1912, Schoolhouse Department, Architects, $15,233.22.
32 First-class construction except roof.
33 Eight rooms and gymnasium addition, 1910, eleven rooms, 1911, Coolidge & Carlson, Architects.
34 Land donated to town of Hyde Park by Mr. Elihu Greenwood.
35 Land donated to town of Hyde Park by Mr. Lemuel Green.
36 Land donated to town of Hyde Park by Mrs. Hemenway.
37 Four-room addition added, 1911, Oscar M. Higgins, Architect.
38 Thirteen rooms and study hall addition built, 1912, James H. Ritchie, Architect.
39 Four class-rooms, manual training and cooking room added, 1912, H. L. Wardner, Architect.
40 Six-room addition built, 1912, H. H. Atwood, Architect.
41 Nine-room addition built, 1913, Coolidge & Carlson, Architects, $90,000.00.
42 Contains assembly hall.
43 12,737 transferred from old town of Dorchester.
44 Six-room addition built in 1913, Brigham, Coveney & Bisbee, Architects.
45 Addition built, 1914, contains assembly hall and master's office, $10,626.26, Edward I. Wilson, Architect.
46 Eight rooms and assembly hall added, 1914, $60,703.29, Charles K. Cummings, Architect.

REPORT OF THE COMMISSIONERS.

Hon. George A. Hibbard,

Mayor of the City of Boston:

Dear Sir, — In accordance with the provisions of chapter 473 of the Acts of 1901 the Board of Schoolhouse Commissioners submits herewith its sixth annual report, covering the period from February 1, 1907, to February 1, 1908.

I.

POWERS OF THE BOARD.

The powers of the Board have been slightly modified by the terms of chapter 450 of the Acts of 1907, which lays down a definite form of procedure for the inception of new work, and establishes more clearly the duties of the School Committee and of this Board. The act also makes permanent provision for new buildings, a matter the importance of which was urged in the report of last year. Briefly, this act provides that the School Committee shall designate the districts where additional school accommodation is necessary, in the order in which, in its opinion, provision for the same should be made, and that the Schoolhouse Commission shall certify to the School Committee the amount which, in its

opinion, will be required for each item until they have reached the total of the appropriation available for that year. The appropriations authorized are an amount not exceeding one million dollars for 1907, one million for 1908, and thereafter not exceeding five hundred thousand. This new fund is available not only for new buildings, but also for such enlargement of schools as will provide additional school accommodation. This makes apparently adequate provision for new buildings, but does not in any way relieve the pressure on the amount appropriated annually for repairs. This amount was fixed by chapter 448 of the Acts of 1901, and was possibly adequate to care for the buildings then existing, but it did not take into account the large increase in buildings authorized by this same act, which as they were rapidly completed became an unusual added annual charge for maintenance. This was carefully stated in last year's report, but no remedy has been found and no relief afforded.

When it is borne in mind that equipment of the old buildings for the new work that is being constantly undertaken — for the evening schools, kindergartens, manual training, cooking, sewing, drawing and modelling in the elementary schools and for handicraft and science work in the high schools — all comes as a charge on the repair account, it is not difficult to see the impossibility of doing both this and the legitimate repairs as they should be done.

The Board therefore earnestly urges your Honor to provide relief for this situation, either by an increased appropriation from the tax levy, or by such modification of the act of 1907 as will permit the Board to pay the extraordinary expenses connected with the development of the school system out of the appropriation for Land and Buildings for Schools. This will leave the appropriation for repairs to be expended for its legitimate purpose, for which in that case it would probably be sufficient.

II.

WORK EXECUTED UNDER THE APPROPRIATION FOR LAND AND BUILDINGS FOR SCHOOLS.

The work done this year by the Board will be considered under five heads:

1. Report of progress on buildings described last year, and on the new work undertaken since then.

2. The revision of standards of cost to agree with reduced size of rooms.

3. Future accommodation.
4. Report on sanitation installed.
5. Report on fire protection.

(1.) REPORT OF PROGRESS ON BUILDINGS DESCRIBED LAST YEAR AND ON NEW BUILDINGS UNDERTAKEN SINCE THEN.

(*a.*) *The Charlestown High School.* — The Charlestown High School, reported on last year, was due to be completed on March 8, 1907, but was not completed until May 18, 1907, and was occupied for school purposes on September 11, 1907. The cost to date compares with the original contract price as follows:

	Original Contract.	Contracts to Date
General contract	$239,137 00	$229,432 79
Granite contract	67,000 00	67,033 00
	$306,137 00	$296,465 79

The area of the building is 16,204 square feet, and the cubical contents 1,700,000 cubic feet, which at date (February 1) gives a cost per cubic foot of 23 cents.

This is the first high school executed by the Board and is by no means a satisfactory gauge as to the proper cost per pupil of a high school. It figures, however, as follows on the basis of the test proposed in last year's report: The total accommodation is 540, which represents 13½ unit class-rooms of 40. The building is one of moderate size and may be allowed the high cube, 82,000 per class-room. This gives 1,107,000 cubic feet, which at 24 cents is $265,680. The actual cost was $296,465.79. A number of things, in addition to the inexperience of the Board in high school planning, complicated this building. From the time of the first sketches to the time of the completion of the building, the School Committee was changed from twenty-four to five, three different superintendents and two different principals advised on the plans, two mayors and one acting mayor were actively interested in the building; the last change of all, necessitated consultation with the Trustees of the Boston Public Library and allowing them certain space in the building (which, however, has never been used). All these matters meant changes and expense, and, in addition to this, the Board had voluntarily incurred the expense of a granite exterior.

The building cannot therefore be taken as one which adds anything reliable to statistics on the cost of high schools.

(*b.*) *The Normal and Girls' Latin Group.* — This also was reported last year. The cost to date compares with the contract price as follows (the original estimates without the Model Building were reported last year, pages 7 and 8):

	Original Contracts.	Contracts to Date.
General contract	$663,980 00	$678,049 93
Heating contract	45,882 00	61,527 16
Plumbing contract	29,062 00	32,105 41
Electric contract	20,360 00	30,590 65
	$759,284 00	$802,273 15

The date set for the completion of the Normal and Girls' Latin Schools was August 7, 1907, and for the Model Building was September 11, 1907. The former were completed and occupied for school purposes on September 11, 1907. The Model Building was completed on October 11, 1907, and occupied by the High School of Commerce on October 14, 1907. This delay was owing in a great measure to the fact that there were four contracts on these buildings, which involved the usual complications. A severe winter, difficulties with water, complicated by lack of connection with the sewer system and lack of co-ordination between contractors were the chief causes of delay. The various changes in authority, mentioned under the Charlestown High, added to the difficulties here also, noticeably in the vacillation shown as to the construction and occupation of the Model Building. There has been a large amount of extra work on these contracts, for very little of which were the architects in any way responsible. Some of it was due to changes in plans caused by mistakes of the Board — as, for example, an over economy in wardrobe space (which disregarded the size of young women's hats), and necessitated a large expenditure for additional wardrobe space; some was due to misunderstanding of plans or change of view on the part of school authorities, but most of it was due to the expense necessary to install a high school in a building planned for elementary use. If, as now seems likely, the so-called Model School, now used as a High School of Commerce, shall continue to be used for high school purposes, say for the Girls' High School of Practical Arts, it is most unfortunate that it should have been erected on the lines of an ordinary elementary school, and much further expense will be involved in making it really adequate for

GIRLS' LATIN SCHOOL, NORMAL SCHOOL, GYMNASIUM BETWEEN.

PEABODY & STEARNS, MAGINNIS, WALSH & SULLIVAN, COOLIDGE & CARLSON, Architects.

this other use. Too much emphasis cannot be placed on the necessity for careful study of such problems, not after they are under way, but when they are on the drawing boards.

(*c.*) *The Dorchester High Annex.* — This was reported last year, and the matter is still in abeyance. The Street Commissioners were requested by this Board to take land adjoining the school lot, which was done on June 16, 1905, but no further action has been taken. Temporary accommodation has been furnished to the pupils, however, by the placing of three portable buildings on an adjacent lot.

(*d.*) *High School of Commerce.* — The vote of the School Committee, establishing the High School of Commerce in the Lewis district, was rescinded June 10, 1907, and hence, though land had been advertised for and bids opened, as stated in last year's report, nothing further has been done in regard to the matter.

The work thus far reported nearly exhausted the old appropriation for Land and Buildings, and in making up the list for 1907 the Board, with the advice of the Superintendent, decided that the small balance should be used, first, to complete a small addition to the Quincy district for a manual training room, and then for various land takings where buildings would be needed in the near future. The districts thus to be provided for were the Blackinton, Dudley, Longfellow, Robert G. Shaw, Bennett and Edward Everett.

(*e.*) *Quincy District Manual Training School.*— On January 21, 1907, the School Committee passed an order requesting this Board to provide additional accommodation for manual training in the Quincy district. On the 30th of March, 1907, in accordance with this order, the Street Commissioners were requested to take land on Tyler street, adjoining the Quincy School lot. This taking was made July 23, 1907, $6,000 being paid for the lot, which contained 1,513 square feet. Plans for a four-room brick building were made in the office of this Board, and specifications written, and, on August 1, 1907, the contract for erecting and completing this building was awarded to Whitcomb & Kavanaugh. This contract included all trades, but had no forfeiture or bonus clause. The date of completion was originally set at October 1, 1907, but, owing to various changes which were made, the time was extended to January 16, 1908, and the building at date (February 1) is practically complete. The original contract price and the amount of contract to date are as follows: Original contract, $13,796 ; contract at date, $15,637.82.

(*f.*) *Blackinton District Elementary School.*— On Janu-

ary 5, 1907, the Board advertised for land in the Blackinton district, in accordance with the order passed by the School Committee, December 31, 1906, requesting the Board to provide additional school accommodation in that district. The Board, with the advice of the Superintendent, having decided that the lot located on Moore and Chaucer streets was the best for this purpose, requested the Street Commissioners to take the land, and a taking was made on August 15, 1907. The new building for this district does not appear on the School Committee's list of June 18, 1907, and therefore no further action has been taken in the matter.

(*g.*) *Dudley District Elementary School.* — Land was advertised for in this district on January 31, 1907, but up to date no taking has been made. Two hearings have been held, on February 21 and December 20, 1907, and the various lots offered have been inspected by the Board, the Superintendent and ex-Mayor Fitzgerald, but the Board has not as yet determined upon any particular lot of land. The building for this district does not appear on the School Committee's list of June 18, 1907.

(*h.*) *Longfellow District Elementary School.* — On March 19, 1907, an order was passed by the School Committee, requesting that this Board provide additional elementary accommodation in the Longfellow district. Accordingly, on June 13, 1907, land was advertised for, bids were received and a hearing was had. With the approval of the Superintendent, it was decided that the most available lot was that situated on Beech street, but owing to the fact that ex-Mayor Fitzgerald did not wish to consider any land takings at that time, the matter was dropped.

(*i.*) *Robert G. Shaw District.* — As stated in the report last year (page 13) the Board received a favorable proposition in regard to land adjoining the Mt. Vernon-street School lot, and, having decided to take this lot, requested the Board of Street Commissioners so to do, which they did on June 3, 1907. The lot contained 42,738 square feet and the price paid was $5,555.94. Nothing further has been done in the matter, as the building for this district did not appear on the list of June 18, 1907.

In addition to this provision for the future, it was thought wise to acquire land in Germantown, and on February 18, 1907, the School Committee passed an order requesting this Board to provide additional elementary school accommodation in the Robert G. Shaw district. In accordance therewith, on June 13, 1907, the Board advertised for land. Offers were received and hearing had and the members of

GYMNASIUM OF THE NORMAL AND LATIN SCHOOLS.

PEABODY & STEARNS, MAGINNIS, WALSH & SULLIVAN, COOLIDGE & CARLSON, Architects.

the Board and the Superintendent visited the various lots offered and decided which lot was most advantageous. As ex-Mayor Fitzgerald did not consider it wise, in the financial condition of the city, to approve any more land takings, and, as the building for this district did not appear on the list of items furnished by the School Committee, in accordance with chapter 450 of the Acts of 1907, no further action has been taken.

(*j.*) *Bennett District Elementary School.* — On November 19, 1906, the School Committee passed an order that this Board be requested to provide additional elementary school accommodation in the Bennett district, and on the 23d of the same month the Board voted to take land adjoining the present primary school lot on Hobart street, with the intention of erecting thereon additional elementary school accommodation. On the 1st of March, 1907, land was taken by the Board of Street Commissioners adjoining the Hobart-street School lot, containing 25,973 square feet, for which the sum of $5,843.93 was paid. (For report on the building, see page 10.)

In addition to this immediate need in the Oak square end of the Bennett district, it was thought well to make provision for the future by acquiring land for a building for the upper grades, and the Board therefore advertised for land on November 26, 1906, as stated in last year's report (page 13), the amount asked for being some 40,000 square feet. Financial conditions, as previously stated, interfered with any action on the part of the Board, and the matter is therefore still in abeyance.

(*k.*) *Edward Everett District Elementary School.* — The need of accommodation in the Edward Everett district, as stated last year, proved to be so great that it was decided, after repeated hearings and consultation with the School Committee and the Superintendent, that additional accommodation was required at the Savin Hill end of the district, and a vote to this effect was passed by the School Committee on January 7, 1907. On January 12, 1907, this Board accordingly advertised for land, and on August 21, 1907, a lot on Savin Hill avenue was taken by the Board of Street Commissioners, for which $17,500 has been paid. This lot contains 68,480 square feet and two dwelling-houses. Two rooms in one house have been equipped for the temporary use of pupils until such time as a new building is required. The building for this district did not appear on the list of items furnished by the School Committee June 18, 1907, and consequently no further action has been taken by the Board.

This completes the list of work laid out to be done under the old appropriation. It will be seen that on four of these items, although the Board has advertised and held hearings and inspected the land offered, no action has been taken, as ex-Mayor Fitzgerald was unwilling to authorize any expenditure for land purchases in these districts, the Dudley, Longfellow, Robert G. Shaw (Germantown end), and the Bennett (Oak square end).

The new loan was to be apportioned by the School Committee, and, therefore, on June 18, 1907, in accordance with chapter 450 of the Acts of 1907, already referred to, it was ordered by the School Committee that the following districts be designated as those where additional accommodation was needed:

	Pupils.
Agassiz district, elementary school, upper grades	264
Wells district, elementary school, lower grades	300
Bennett district, elementary school, lower grades	100
Adams district, elementary school, lower grades	200
Prince district, high school (Mechanic Arts High School)	800
Phillips district, elementary school, upper grades	880
Edward Everett district, elementary school, upper grades	616
Brimmer district, elementary school, upper grades	1,496

On June 29, 1907, this Board, in accordance with said chapter, returned the list of items prepared by the School Committee, showing the additional accommodation required for the year 1907 in the various school districts, having set against each item the amount which, in the opinion of the Board, would be required for additional accommodation in each of the districts specified, including land therefor when necessary, as follows:

Item 1.—Agassiz district, elementary school, upper grades (building and furnishing)	$62,000 00
Item 2. — Wells district, elementary school, lower grades (building and furnishing)	50,000 00
Item 3. — Bennett district, elementary school, lower grades (building and furnishing)	15,000 00
Item 4. — Adams district, elementary school, lower grades (building and furnishing)	15,000 00
Item 5. — Prince district, high school (Mechanic Arts High School — building and furnishing)	500,000 00
Item 6. — Phillips district, elementary school, upper grades (land, building and furnishing)	358,000 00
Total	$1,000,000 00

Item 7. — Edward Everett district, elementary school, upper grades (building and furnishing).

Item 8. — Brimmer district, elementary school, upper grades (land, building and furnishing).

As the aggregate of the first six items was $1,000,000, the limit of the amount which would become available during the year, under the provisions of chapter 450, the Board presented estimates only for the first six items.

(*l.*) *Item 1.* — *The Agassiz district*, the extension to the Francis Parkman School. The Board had decided, as reported last year, in view of the growing needs of the neighborhood, to proceed with this item, and on the 20th of December, 1906, had appointed Mr. Charles Bruen Perkins architect of the extension. It was not necessary to take land for this building, but the Board feel that the lot acquired some years ago is inadequate for the needs of the building as it will now be, and that adjacent land should be taken for yards. The work is let in four contracts; the building contract was awarded on November 4, 1907, the plumbing contract on the same date, the heating and ventilating contract on December 26, 1907, and the electrical on January 30, 1908.

The amount of the contracts is as follows:

	Original Contracts.	Contracts to Date.
Building contract	$32,400 00	$32,440 00
Plumbing contract	1,750 00	1,885 00
Heating contract	6,077 00	6,077 00
Electrical contract	4,692 00	4,692 00
	$44,919 00	$45,094 00

It is expected that the building will be ready for the term beginning in September, 1908. This is a second class building, and the added accommodation is 264 pupils. The cost per pupil is $170. Taking the whole building, erected at three different times, and now accommodating 664, the total cost, $117,219.03, makes $176.53 per pupil. This is not a good showing for a second class building.

(*m.*) *Item 2.* — *The Wells district*, elementary school, lower grades. It was decided to take care of this item by building a six-room addition to the Winchell Primary Schoolhouse. Plans were prepared by the architectural department of the Board, and on May 20, 1907, the Board advertised for bids. On June 3, 1907, the single contract for building a

third story on this school-house was awarded in the sum of $45,987 to William Crane. All trades and the installation of new pupils' toilets were included, and a forfeit and bonus contract signed for completion. Possession was given of the old building on June 14, and the date of completion was September 11. The building was completed September 1, and the final cost of the work with ten days' bonus was $47,914.40. On basis of accommodation this was not an economical piece of work, for the six rooms cost $160 per pupil. For a job of addition there was not an undue amount of extra, unforeseen work, and as a piece of quick building it was most creditable to the contractor. The building was occupied on September 11, 1907, the date of the opening of the schools for the autumn term.

(*n.*) *Item 3.* — *The Bennett district*, an elementary school, lower grades. Land had already been acquired on Hobart street, adjoining the school-house lot, and on this lot a two-room addition has been built. The plans were drawn and the work done through the architectural department of the Board. Bids were asked for on May 28, 1907, and the contract awarded June 6, to J. F. Griffin & Co., in the sum of $9,200. All trades but the heating and ventilating work were included in this contract. It was at first intended to install a steam heating apparatus, and the Board asked for bids therefor, but, finding that the bids were all very high, they changed their plans and decided to put in furnaces instead, and the contract for these was awarded in the sum of $1,052 to William J. Carlin on August 16, 1907. The date of completion was set at September 2, 1907, but the building was not completed and occupied until October 31, 1907. The original contracts and the completed contracts are as follows:

	Original Contracts.	Completed Contracts.
General contract	$9,200 00	$10,554 24
Heating contract	1,052 00	1,190 00
	$10,252 00	$11,744 24

As this was a wooden building, accommodating but 100, $117, the cost per pupil, is a high price.

(*o.*) *Item 4.* — *The Adams district.* An elementary school for lower grades was asked for, but owing to the fact that it was uncertain in what locality a school of this kind was needed, on account of the fluctuation of population and the varying conditions in East Boston, it was decided that it

would be better to erect temporary accommodation, in the form of portable buildings, on land already owned by the city, than to take more land at that time. Bids were therefore advertised for, and on August 12, 1907, a contract for erecting four portable buildings in the yard of the Plummer School was awarded to W. L. Morrison, in the sum of $8,789. The date of completion was September 11, 1907, and the buildings were completed and occupied on October 25, 1907.

The amount of the contract as awarded and the completed contract is as follows:

Original contract . .	$8,789.	Contract to date . .	$8,789

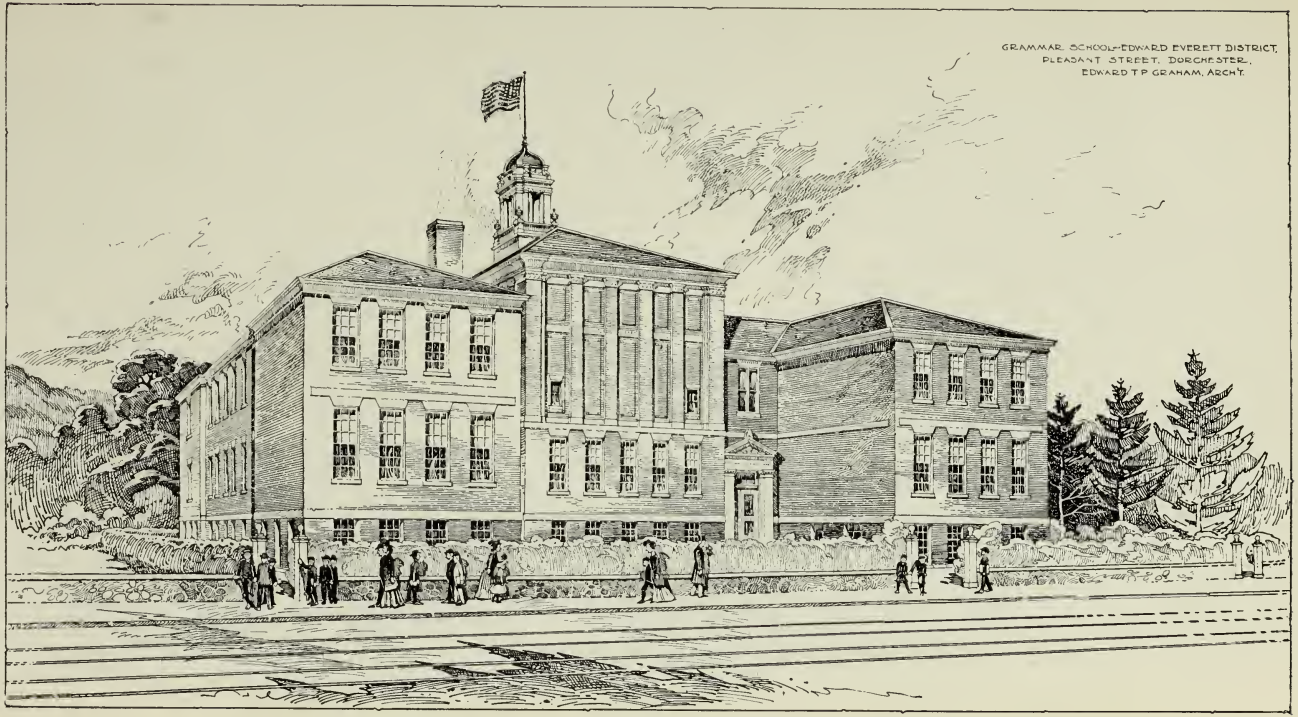
(*p.*) *Item 5.— The Mechanic Arts High School.* The addition to this school has been reported upon annually, the reason for the delay having been fully explained in last year's report. Certain work, however, in the nature of necessary repairs, was proposed and plans made, but when the new appropriation became available and the School Committee, in their list of June 18, 1907, placed this addition thereon as Item 5, it was decided to return to the original plans, prepared by Messrs. Wheelwright & Haven, who had been appointed architects when the decision to erect this addition had first been made. Bids for building and for the heating system were accordingly advertised for on July 5, 1907, and on August 1 the building contract was awarded and was sent to the Mayor for his signature. On account of the financial condition of the city the Mayor did not see his way clear to sign the contract, and the matter was referred to the Finance Commission, who appointed a committee, consisting of Charles W. Eliot, President of Harvard University, Henry S. Pritchett, formerly President of the Massachusetts Institute of Technology, and Rev. Thomas I. Gasson, S. J., President of Boston College, to determine whether this matter was necessary and urgent enough to justify the outlay of the sum appropriated, $500,000. On November 7, 1907, the commission made final report to the Finance Commission, who in turn reported favorably on November 11, 1907, to ex-Mayor Fitzgerald. On November 22, 1907, the building and heating contracts were signed, and on November 29 and November 30, respectively, the plumbing and electrical contracts were signed. The work is now progressing and is to be completed in fifteen months from the date of the contract, namely, February 22, 1909. The amounts of the original contracts and the amounts to date are as follows:

	Original Contracts.	Contracts to Date.
Building	$346,191 00	$322,918 00*
Heating and ventilating	53,400 00	53,400 00
Plumbing	23,878 00	24,130 00
Electrical	32,250 00	32,250 00
	$455,719 00	$432,698 00

(*q.*) *Item 6. — The Phillips district*, elementary school, upper grades. The congested condition of the West End districts was referred to in last year's report (pages 11 and 12), and the School Committee had voted, January 21, 1907, to request this Board to provide additional elementary accommodation in this district. The Board had therefore advertised for land south of Cambridge street, on January 24, 1907, and a hearing was had on the land offered on February 18. It was, however, decided, in view of the fact that a bill was before the Legislature at that time in regard to building a school-house on the Charles River Embankment, to delay for a time. Owing to determined opposition to this bill it was withdrawn, but the need of accommodation being so great that sufficient accommodation could not be afforded by erecting one school in the southern part of the district, the Board advertised for land north of Cambridge street on April 10, 1907, and a hearing was had on May 6, 1907, in regard to the same. No taking was ordered by the Board, because ex-Mayor Fitzgerald expressed himself as opposed to all expenditure for land on account of financial condition of the city. Nothing has therefore been done to relieve the most pressing demand for elementary accommodation that exists in the city. Again the bill to permit the erecting of a school on the Embankment has been presented to the Legislature, as offering the solution which in the judgment of all the masters in the West End, and of the assistant superintendent, meets better than any other plan the needs of the district. If this bill fails of passage, the taking of a suitable area for a very large school, or two areas for two schools, ought to be considered at once.

(*r.*) *Item 7. — The Edward Everett district*, an elementary school-house, upper grades. This school was reported both last year and the preceding year. The Board, with the approval of the Superintendent, decided in favor of a lot situated on Pleasant street, and requested the Board of Street

* $22,773 was deducted on account of work done and paid for between August 1, when the Board awarded the contract, and November 22, when the contract was signed by the Mayor. There has not, therefore, been any saving on the contract price.



GRAMMAR SCHOOL, EDWARD EVERETT DISTRICT.

E. T. P. Graham, Architect.

(For plans, see pages 24 and 25.)

Commissioners to take the same, which was done on March 20, 1907, and on November 20, 1907, the sum of $14,000 was paid for the land. This lot contains 34,899 square feet. Mr. E. T. P. Graham had been appointed architect on September 26, 1906, and has been steadily at work on the plans, which are now nearly complete, but in view of the fact that the appropriation for the year 1907 was not sufficient to cover all items designated by the School Committee, this item, which was the next to the last upon the list, was among those excluded, and it has necessarily been postponed until 1908. It will undoubtedly be on the 1908 list.

(*s.*) *Item 8. — The Brimmer district*, elementary school, upper grades. This being the last item on the School Committee's list, could not be included in the work for this year, owing to the insufficiency of the appropriation to cover the expense.

In addition to the above, one may report on certain other items which have appeared in previous reports, but on which no further action has been taken: (*t.*) The Longfellow Addition; (*u.*) The Girls' High School Addition; and also (*v.*) the Addition to the Roxbury High School, which has not been previously reported.

(*t.*) *Addition to the Longfellow School.* — Item 34 of the original list of forty-two items furnished by the School Committee provided for a new primary school-house in the Longfellow district. This was modified to mean an extension of the Longfellow School. (See page 9 of the first annual report.) Land for this addition was taken on November 14, 1902, containing 8,923 square feet, for which $7,825 was paid. Messrs. Walker & Howe were appointed architects, and plans were prepared for the building, but on March 14, 1903, the Committee on School-houses voted to proceed no further in the matter, and in accordance therewith nothing further has been done.

(*u.*) *Addition to Girls' High School Site.* — This appeared as Item 9 on the list of forty-two items. (See page 9, first annual report.) Land was taken adjoining the school yard on West Newton street on January 29, 1902, and $14,000 was paid for the lot, containing about 4,660 square feet. It was intended to erect a gymnasium and laboratories on this land, and Messrs. Wales & Holt were appointed architects, but other needs being more pressing, it was postponed, with the approval of the Head Master.

(*v.*) *Addition to the Roxbury High School.* — Land adjacent to the Roxbury High School was taken by the Board of Street Commissioners on August 17, 1905, the lot con-

taining 9,062 square feet. As the appropriation at that time was not sufficient to meet the expense of erecting an addition to the Roxbury High and also taking care of other and more urgent needs, the house on the lot was fitted for recitation purposes and the old stable was arranged for a garage for the motor cars of this department, and is still used as such.

(2.) The Revision of Standards of Cost to Agree with Reduced Size of Rooms.

On March 19, 1907, the School Committee voted to fix the limit of classes in the elementary grades at 48 for 1907, 46 for 1908, and 44 for 1909. While it would be impossible, if a demand existed for seating accommodation, to enforce this in the old schools where the class-rooms are of sufficient size to accommodate 56, it was evident that in the new buildings it should be the policy of the Board to support the School Committee in this wise move, and, therefore, in consultation with the Superintendent of Schools, it was decided that in future the new buildings should have the size of the class-rooms reduced so as to accommodate no more than the number fixed upon by the School Committee.

In the first building to be erected since the establishment of this standard, the Edward Everett District Elementary School, upper grades, the rooms take five rows of eight desks, with two additional ones at the front, a total of forty-two, which gives a room twenty by thirty-two the advantage of a narrow span, and yet a length no greater than the length of the old standard; and also rooms twenty-three by twenty-nine, which take six rows of seven desks, a total of forty-two. This latter would presumably be in future the standard room. With a room of smaller area and less span than even the smallest room that we had adopted before, which was twenty-four, the Board believes that it is amply justified in reducing the height of the room, and this economy, taken in connection with economy in the way of steel required for the reduced span, will, we hope, enable us to complete the new buildings with smaller rooms, without increasing the cost per pupil that prevails with the larger rooms.

The following is the tentative standard for the architects:

No difference shall be made between the lower elementary schools and the higher elementary, which contain also an assembly room, but the assembly room shall be rated as representing the area of the class-rooms it covers; this

number of class-rooms shall be added to the number of actual class-rooms, and 30,000 cubic feet per class-room shall be allowed. The price, 22 cents, as previously established by this Board, shall be continued.

The new Edward Everett School is a building of fourteen rooms, and the assembly hall occupies the space of two rooms, including the corridor space. It is therefore rated as a sixteen-room building, at 30,000 cubic feet per room, or 480,000 cubic feet, at 22 cents, fixing the high limit of cost $105,600. On the old basis it would have been classed as a grammar school of fourteen rooms, and allowance would have been made of 46,000 cubic feet per room, or 644,000 cubic feet, at 22 cents, making $141,680. The cost per pupil in this case would have been, at the average rate of 50 per room, $202.40. In the building as proposed, rating the rooms at 40 instead of 50, the cost per pupil will be $187.

This new standard of 30,000 cubic feet per room and 22 cents per cubic foot is entirely theoretical, and has not yet been tested out. It is hoped that it may prove true for the small schools, and that for larger schools a still further economy may be made.

(3.) FUTURE ACCOMMODATION.

According to the figures taken by this Board in October, 1907, there were in portable buildings at that time 3,647 children; in hired buildings there were 1,238 children, and in halls, basements and other rooms not intended to be used as class-rooms there were 1,532 pupils. While it is seen that 6,417 pupils are outside of the regular class-rooms in the permanent school buildings, this does not mean that new accommodation is required for this number. The portables will always be required to care for shifting increases, and the number we have now is probably none too large. There remain 2,770 who are outside the regular class-rooms, but not in portables. Even this is not a definite gauge of the number of pupils for whom new buildings are required, but it is approximately so.

For the first time since this Board was established there has been practically no increase this year in the number of children in the elementary schools. The number of pupils in the years since this Board was created are as follows:

1901.	1902.	1903.	1904.	1905.	1906.	1907.
77,044	79,509	81,876	83,670	85,505	87,513	87,524

The Board does not account for this, but merely states it. As mentioned in previous reports, one reason for the increase

in school population in a ratio in excess of the increase in the population of the city is the increase at both ends of the legal grades. At the lower end a considerable increase in kindergarten :

1901.	1902.	1903.	1904.	1905.	1906.	1907.
4,276	4,541	4,907	5,159	5,185	5,516	5,497

and at the upper end an increase in the number of pupils continuing on beyond the sixth grade. This increase was bound to be temporary. Having reached a point approximating the condition when all children would enter kindergarten and go through the eighth grade, this source of increase would stop, and thereafter the increase in school population would advance as the population of the city advanced. In hard times the children would be withdrawn from school early, and there might be a reverse of conditions. A decrease in immigration and an increase in emigration is a second possible cause for the absence of increase, and a third is found in the new Roman Catholic schools, those occupied in 1907 taking approximately 15,000 pupils. This year, from whatsoever cause, the increase in school population is wholly in the high schools.

The crowding and the need for new accommodation reported last year still exists; some land has been bought, but not in those districts where new buildings were most urgent, and no steps, therefore, could be taken to relieve the congested districts.

The West End (the Washington, Wells, Phillips and Bowdoin districts) is still the most congested district. The petition to the Legislature, asking for permission to place a school on the Embankment, was withdrawn, owing to the active opposition of the Park Department. The Board then advertised for land, but, although favorable offers were made, both north and south of Cambridge street, the Mayor felt that the financial condition of the city forbade any purchase.

In the Dudley district offers of land were received, but no action taken, for the same reason.

In the Edward Everett district the Savin Hill lot was bought, so that here a step has been taken, but, as the building here is not yet imperative, nothing further has been done beyond fitting up for temporary accommodation a house on the lot.

In the Bennett district the case is the same as in the Dudley. In the Blackinton district the land has been taken, but the School Committee has not authorized a building. The land comprises 53,986 square feet on Pope, Moore and

Chaucer streets, but the price has not yet been fixed by the Street Commissioners.

In the Robert G. Shaw district, the land adjacent to the Mt. Vernon-street School was purchased for future development; no building is yet authorized here. Land at the Germantown end, although offered on favorable terms, has not been taken on account of financial conditions.

In the Longfellow district the case is the same as in the Shaw; offers for land have been received, but no action taken.

The North End is crowded, and, in some cases, served by poor buildings; the South End, especially the Sherwin and Hyde districts, is overcrowded, and it is only thanks to the lack of increase this year that we are not much worse off than last year. The last elementary buildings to be built were occupied in May, 1906. No building has been begun since then, except the four-room addition to the Francis Parkman, the six-room addition to the Winchell, and the two-room addition to the Hobart street, and none is under way except the Edward Everett, for which plans are now being made. This is due to conditions over which the Board has no control.

The increase in high schools this year has been 527, which is above the normal, and next year the increase promises to be larger. Dorchester and Roxbury are seriously overcrowded. The new High School of Commerce will tax the Patrick A. Collins School to the limit. The Girls' High School of Practical Arts will outgrow its accommodation in the Lyceum Hall; the addition to the Mechanic Arts High will not be completed in time to relieve the pressure there until the school year is nearly over. The Girls' High School is crowded and has not accommodation at all in line with the newer schools; a building for gymnasium and class-rooms or laboratories on the land adjoining, which was acquired on January 29, 1902, is much needed. If the Dorchester High Annex is built, a new building planned for the High School of Commerce, and the Girls' High School of Practical Arts moved to the Collins the city will be fairly well served. This means a large expenditure for high schools.

(4.) SANITATION INSTALLED.

Owing to lack of funds and to the fact that, as reported last year, the most serious of the sanitary problems in the old schools have been taken care of, very little sanitation work has been done this year. The fixtures, with the modification of the short hopper closet, remain the same.

The following is a description of the work for this year:

Phillips Brooks School. — Removed nine water-closets and installed instead 20 feet 6 inches of the regular type of slate urinal, in order to give the standard equipment for the number of pupils in the building, at a cost of $646.

(5.) FIRE PROTECTION.

The general statement made in last year's report is still true in this regard. The work installed this year was an addition to the fire escape at the Somerset-street School, consisting of an additional balcony on the line of the third floor and a new stairway to the present balcony on the second floor.

The Board wishes to emphasize again the distinction to be drawn between fire protection with a view to the preservation of life and that which is provided with a view to the preservation of property. The former head is so infinitely more important that the Board has felt justified in using the limited means at its disposal primarily for this purpose. Work under this head would include signals for the fire drill, free corridors and stairways, exits of sufficient number, provided with doors that open out and with locks so arranged as to make it impossible to lock them from the inside. There are two standard types of school doors, the main door being fitted with a heavy, master-keyed lock, which opens with a key from the outside, but from the inside has no keyhole, but is opened by the door handle only. The other type has a spring latch on the inside, and nothing on the outside except a pull. It can be opened at any time from the inside, but can be opened from the outside only when the spring latch is put up.

In addition to the exit doors opening out, the invariable rule for all new buildings is that the wardrobe doors should be double swing and class-room doors should open out. There has been some discussion as to whether class-rooms should have more than one door, and also whether there should be communicating doors between class-rooms. The Board took the opinion of Fire Commissioner Russell and his chiefs on both of these questions, and it was the opinion of the fire authorities that it would be safer to have but one door from the school-room, so that the children would always go to one spot, where they should be under the supervision and control of the teacher; that for that reason it was not desirable to have a second door to the corridor, nor was it desirable to have inter-communicating doors. Commissioner Russell said that in buildings of the type that we are

erecting, of first class construction, that rather than have the children hurrying through unusual passages, through rooms that were largely occupied by desks, it would be safer, in case the corridors were so filled with smoke as to make passage through them dangerous, to close the class-room door and keep the children within four fireproof walls, a fireproof floor and a fireproof ceiling.

As this report was going to press the Cleveland disaster called the attention of school authorities throughout the country, but especially in the older cities, to the condition of the schools. Boston has a large number of buildings erected when fireproof construction was unknown and modern precautions as to corridors, stairs and doors were not considered. The Board on its appointment took up as its first duty the main exits, saw that all doors opened out, and fitted all with standard master-keyed locks that could not be locked from the inside. Later they equipped many of the more dangerous buildings with fire escapes, and did fireproofing in old basements to protect about the heating apparatus. The Board would have done more if they had had funds. The chairman has now submitted a complete report on the work that it is desirable to do in basements, the fire escapes that might be wisely added, and the buildings that should have a better equipment for giving fire drill or actual fire alarms. This work to complete would require about $200,000, and the Board has already started in on it, with confidence that the needed money will be provided. A further statement on this subject will be found in Appendix IX.

III.

REPAIRS.

The Board started the year with $268,300 for repairs, of which amount approximately $20,000 was needed to meet bills necessarily held over from the previous year, leaving a balance of $248,300. With this amount the attempt has been made to do the urgent repairs and to respond as far as possible to the calls of the School Committee for new equipment. This sum is wholly inadequate. Many of our older buildings require repairs which are in the nature of complete renewals, and the buildings built by this Board, reported last year as worth $3,729,284, are now increased by the Charlestown High and Normal and Latin group to $4,402,284. All these new buildings require constant repair. True economy demands it.

The Board is at present engaged in attempting to systematize more thoroughly the repair work, chiefly with a view to concert of action, so that the inspectors and the heads of the

architectural and engineering departments shall be familiar with what is being planned for in each building and shall work in harmony. This, it is believed, will result in uniform treatment of all requisitions and will avoid conflict of work.

IV.

POLICY OF THE BOARD.

The policy of the Board as to the employment of architects remains unchanged — the architect's agreement is in Appendix V. — as it is not in a position to undertake the architectural work of the new buildings. The cost and equipment of the elementary schools has been modified by the change in classroom size already noted (page 14). The various attempts to fix standards for laboratory equipment in high schools have not met with unqualified success, that advised by the experts not being always accepted without material modification. The lecture-room seat met with far more adverse than favorable criticism, and cannot therefore be pronounced an unqualified success. The book system of the Charlestown High, the books of the day scholar being put away in pigeon holes to leave the desks free for evening use, has been found very satisfactory by both the head master of the Charlestown High and the master of the Evening School.

On the proper cost per pupil of the high schools the Board is not much advanced beyond what was learned from the Charlestown High. Here the cost to date was $296,465.79, and the accommodation 540 would give $549 as the cost per pupil. This seems to the Board too high a figure, but it is not apparent how it can be reduced and yet give the space and equipment that modern methods demand. The Normal Group is too unusual and was too much affected by the conditions under which the contract was let to be of much service as a guide. Taking the group as a whole there is in the Normal accommodation for 350, in the Latin for 600, and in the Model, now occupied as the High School of Commerce, 550.* The total cost to date of the group was $802,273.15, or $534.17 per pupil.

The engineering departments for heating and electric work are now fairly established, but if the Board is to have new buildings to handle, the force is entirely inadequate for the work and must be increased. The department of civil engineering and the architectural department can handle the work now assigned to them, but could not attempt new

*As originally planned this was an 18-room elementary, and consequently accommodated 850 pupils; the figure here given represents its high school accommodation.

buildings. The former takes charge of all surveys, many of which are required of land that is being considered, borings, information in regard to lines and levels, sewers, water, gas and electricity, and the lay out, planting and care of the grounds. In Appendix VII. will be found a statement as to this latter work and some photographs showing the work done.

The close relation between the Board and the small School Committee has been of great advantage, and the efficient help of the Superintendent and Assistant Superintendents has made it possible to keep in close touch with the educational side of the work, and to be prepared to help, as far as our funds would allow, in the improvements in educational methods. Through the reports of the Assistant Superintendents, and with the advice and co-operation of the Superintendent, the Board has been able to plan intelligently for the future, but the plans have not as yet been carried out, owing to the financial stringency already mentioned.

On the question of artificial light and the colors in schoolrooms the School Committee did not find themselves in accord with the Board, and appointed a special committee of oculists and electricians to report. The Board put at the disposal of this committee the results of its experiments and the services of its expert electrician, and conducted for the committee a series of experiments. This committee continued investigation along the lines then being studied by the Board, and, in brief, advised diffused light placed off-centre, so as to place the preponderance of light forward and to the left, very light walls, tones just off white, toward green or buff, and very light colored furniture. With the last two recommendations the Board does not agree. The Board's report on this matter is given in Appendix VIII. The first they had already decided to test, not because it gave better light, but because it gave as good light at lower voltage, and fixtures that were more easily kept clean and efficient. They also propose to test a simpler and more efficient form of fixtures for reflected light, with the high efficiency form of lamp. For rooms where pupils do not all face one way, laboratories, etc., the partial elimination of shadows is more important than controlling its direction.

The joint committee, composed of the School Committee and the Board, with the Mayor as chairman, has had numerous sessions looking toward the sale of certain properties, but as yet the market has not warranted any such sale, nor has the School Committee taken the first necessary step of releasing the properties. The bill presented to the Legis-

lature last year, authorizing the same committee to purchase land, was withdrawn, as the School Committee did not wish to have this responsibility.

V.

GENERAL DEDUCTIONS.

All buildings are required to be fireproof, so-called first class construction, the cost limited by allowing 30,000 cubic feet as a maximum per class-room, and 22 cents per cubic foot; in upper elementary schools counting the assembly hall as the number of class-rooms whose space it occupies. For high schools the experience of the Charlestown High and Normal Group seem to show that we are on too large a scale, too generous in space and equipment for science laboratories, handicraft, commercial studies, gymnasia, baths, etc., for the number of pupils served. The Board believes that $400 per pupil ought to be sufficient, and this would mean about 65,000 cubic feet per class-room of forty, and 24 cents a cubic foot.

For the exterior, common red brick and stone, and the smaller the building the less the ornament; for the grounds outside the buildings from 30 to 50 square feet per pupil * for all elementary buildings containing paved spaces for assembling and marshalling the classes, experimental gardens, and planted spaces for the enclosure of the lot and the dignified and beautiful setting of the building, and all kept as open as possible.

In addition to this it may be noted that the Board has found that soft foundations requiring piling, waterproofing, reinforced concrete, or any other unusual expense below grade, will add in the neighborhood of 2 cents per cubic foot to the building, and where such conditions exist the building should be so designed as to keep them down to the limit of cost.

Types of plan that have been found successful in Boston schools were given in the report, 1906–1907. Of these, some of the best are here repeated.

* SCHOOL.	Area.	Building.	Walks.	Yard.	Planting.	Per Pupil.
		Per cent.	Per cent.	Per cent.	Per cent.	
William E. Russell..	50,075	31	5	32	32	38
O. H. Perry	45,000	21	19	23	37	50
J. G. Whittier.....	34,374	21	7	38	34	54
Tuckerman.....	21,584	35	6	42	17	28

The Oliver Hazard Perry and James Otis School (Fig. 1), six-room plans with rooms on all four aspects. The north rooms might well have end windows to admit occasional sun.

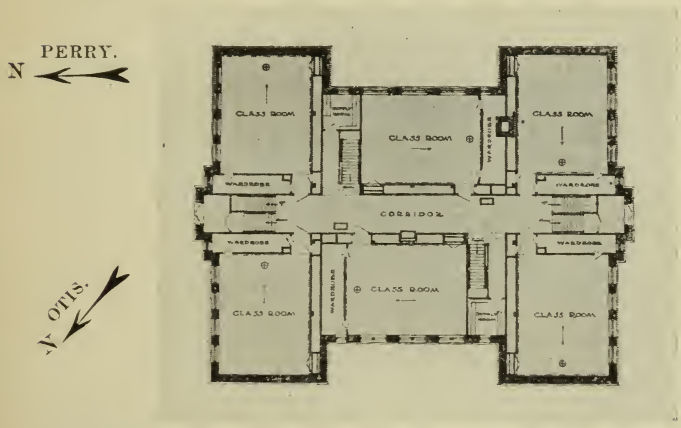


FIG. 1.

The John Greenleaf Whittier (Fig. 2), a five-room plan, rooms facing two ways only. If the two north rooms were turned to take their light from the east and west, it would

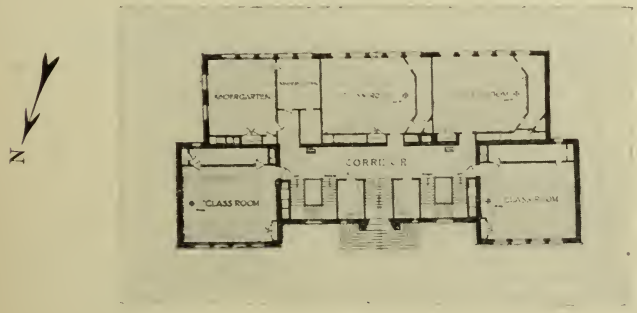


FIG. 2.

make these two better. If local conditions preclude this (adjacent buildings), some light from east and west might well be added.

The Patrick A. Collins (Fig. 3), the model school of the Normal Group, a six-room plan. With a slight change of aspect all of the six rooms would have sun during part of the day. The assembly hall is on the first floor.

The new Edward Everett School (Fig. 4). This plan is given as a type of a school with the new standard room, seating forty-two instead of fifty-six. Of the fourteen rooms only one is without sun.

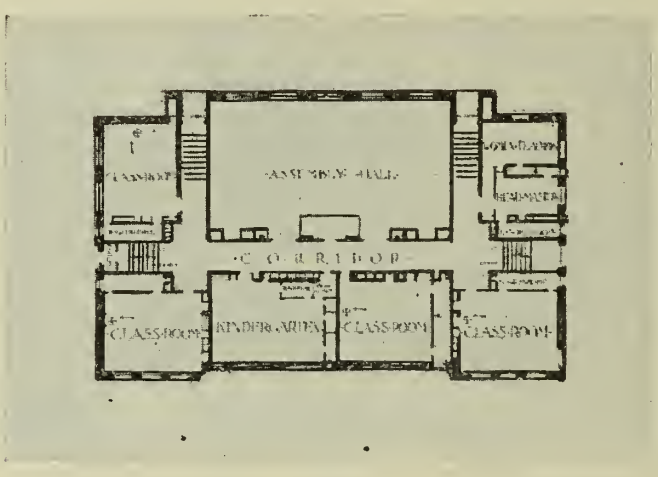


FIG. 3.

The assembly hall on the second floor gets the necessary height in the pitch of the roof. It remains to be seen whether

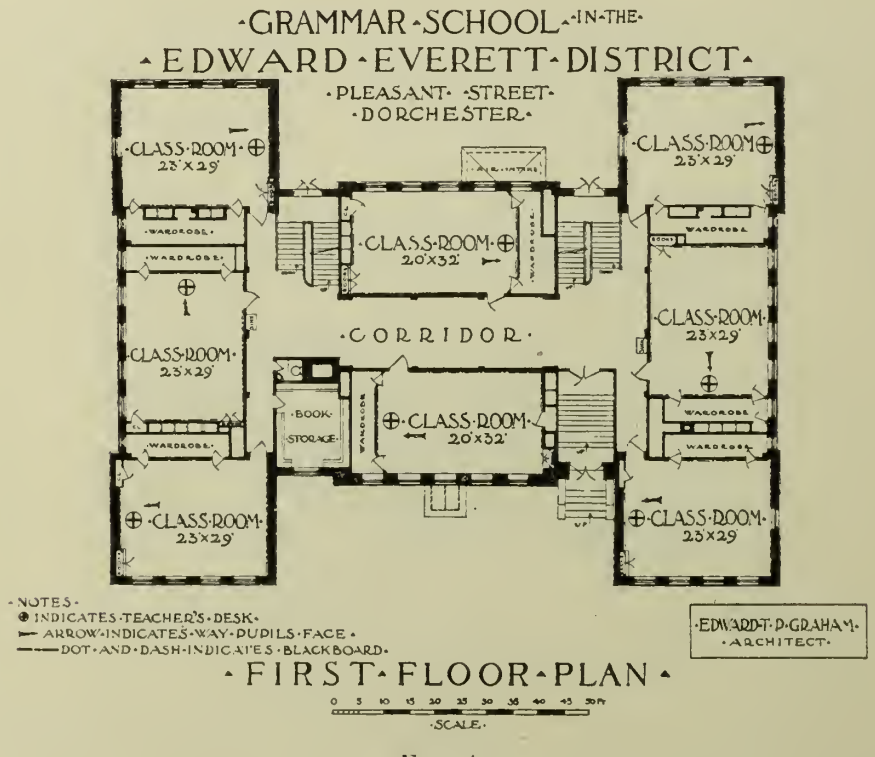


FIG. 4.

or not these smaller rooms of this plan can be built as economically per pupil as the room of the old and larger standard.

The square-foot test for floor plans remains effective for showing quickly whether a plan is economical. The class-room area on one floor multiplied by two should be the out-

side limit of the area of that floor. The Board believes that buildings should be planned so as to give sunlight in every room at some time of the day, but that it is better not to have an aspect that gives sun all through the school hours.

The assembly hall should be placed as near the ground as possible, and never up more than one flight, and this may well have north light opposite or to the right of the platform. The first floor should be so placed with relation to grade as to make it possible to have doors to basement from the grade, without an area, and the steps inside under cover. Basement

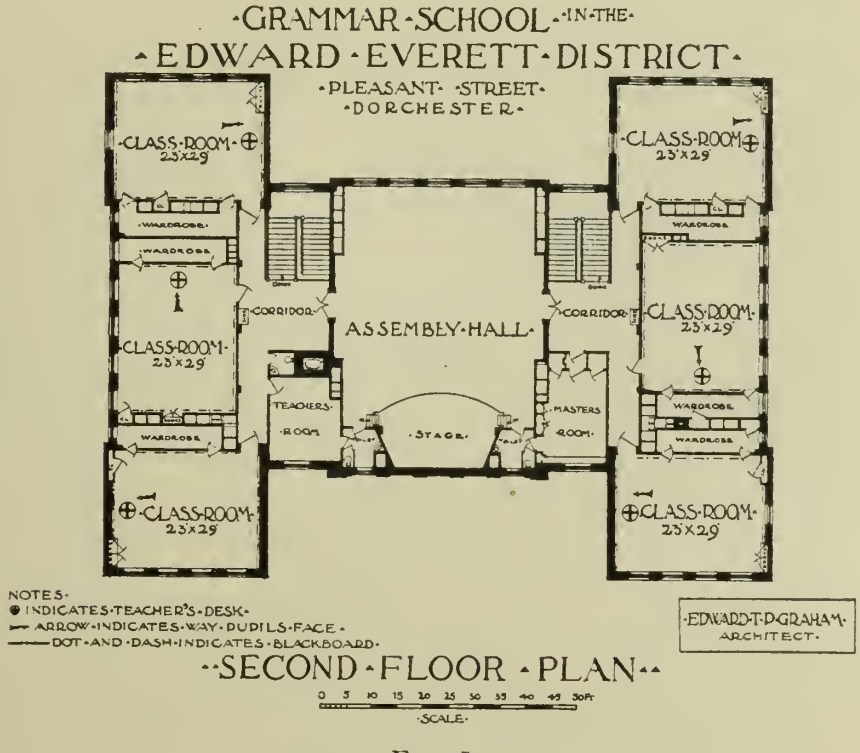


FIG. 5.

floor will then be not more than four feet below grade, and better if less. This will give a well-lighted basement for the playrooms, toilets and manual training and cooking rooms. The boiler room floor being at a lower grade will make it possible to have plenum chambers or ducts below the general basement grade and thus avoid galvanized iron ducts overhead.

The grounds will contain the brick-paved playgrounds, really mere assembling spaces — which are generally lined off for marshalling the classes — permanently planted spaces, in which the Board has used with success the following shrubs, selected for their hardiness or for their flowering in term time:

Forsythia suspensa.	Golden bell.
Spiraea van Houtteii.	Van Houtte's spiraea.
Syringa vulgaris.	Common lilac.

Syringa persica.	Persian lilac.
Spiraea Thunbergii.	Thunberg's spiraea.
Lonicera tartarica.	Tartarian honeysuckle.
Amelanchier canadensis.	Shad bush.
Rosa rugosa rubra.	Japanese dog-rose.
Philadelphus grandiflorus.	Mock orange.
Deutzia gracilis.	Deutzia.
Hibiscus.	

And for hedges:

Japanese barberry.	Berberis Thunbergii.
Japanese privet.	Ligustum ibota.

Also spaces for garden practice for the pupils with a depth of about 18 inches of good loam. The boundaries have been a vexed question. The Board has tried to eliminate the old forbidding (and inviting) iron fence and to substitute hedges. But all those that go by break them down. The Board believes time will teach respect. Already in some places the hedges are in good condition. Further information about the grounds will be found in Appendix VII.

The adjustable furniture, both desk and seat, as reported in previous years, has been continued with success, modified only by the practical difficulties of ensuring proper adjustment.

Further consideration of all these problems will be found in Appendix X., an address delivered before the American School Hygiene Association, at Atlantic City, N. J.

GENERAL INFORMATION FOR FIRST CLASS CONSTRUCTION.

Elementary Schools.

SCHOOL-ROOMS. (1.) *Size* will be 23 by 29 or 20 by 32 for elementary grades and not less than 12 feet in clear. Modification allowable only after consultation with the Board. A building having no grades above IV., with no desk larger than 21 inches, might have rooms 22 by 28, but the standard size gives the extra space wanted for modern methods. Desks should be laid out on the preliminary plans. (See drawing.) This drawing should give 18-inch, 21-inch and 23-inch desks, laid out in a 23 by 29 room. Every class-room shall be consecutively numbered on the plans to designate it. These numbers to be for the doors, as noted below, and for the annunciator. Other rooms that appear on the annunciator

GROUNDS OF THE SOUTH BOSTON HIGH SCHOOL.

NOTE.— The other illustrations in this report show school grounds and refer to Appendix VII.

to be named on the plans, as assembly hall, teacher's or master's room, cooking-room, manual training room. The Kindergarten shall be counted as a class-room. In high schools, both class and recitation rooms to be numbered, other rooms named.

(2.) *Windows* will be on the long side for left hand lighting. The glass measured inside the sash shall contain not less than $\frac{1}{5}$ of floor area, about 135 square feet for a room 23 feet wide; * neither double run of sash nor double glazing will be required, but a dust-proof metal weather strip; the head square and close to the ceiling; the sill about 2 feet 6 inches from the floor; the windows divided with muntins, no large sheets of glass. Finished with plastered jamb, no architrave, metal corner bead.

(3.) *Doors.* — One to corridor, 3 feet 6 inches by 7 feet, partly glazed, to open out, placed preferably near the teacher's end; brass-plated steel butts, 3-lever mortise lock, master-keyed; cast-brass knobs, marble thresholds to corridors. Doors to have 2-inch plain brass numbers, and cardholders $3\frac{1}{2}$ inches by 5 inches, and hooks to hold open.

(4.) *Floors* will be Georgia pine rift, or maple.

(5.) *Walls* will be painted burlap up to top of blackboards, or of tack boards, and above this plaster, tinted in water color — a warm gray green or buff gives the best results; the blackboards 4 feet high, 2 feet 2 inches from floor in kindergarten, 2 feet 4 inches to 2 feet 6 inches to Grade IV., and 2 feet 8 inches in Grades V. to VIII. Behind the teacher and on one long side in lower grades and behind the teacher on long side and end in upper grades and high. These will be of best black slate, $\frac{1}{4}$ inch thick. In lower grades a rack or tack board for holding cards is required above the blackboard. A picture moulding at top of burlap and also near ceiling in all cases. (See drawings.)

(6.) *Ceilings* will be level, plaster, tinted a light cream color.

* It is evident that if this area of glass is requisite to light a room in a building with free space about it, such for example as the Sarah J. Baker School, it is inadequate for a room in a building situated like the Christopher Columbus, on a narrow street. Under exceptionally free conditions, with no obstruction to the direct light from the sky, it is possible that the area of glass might be reduced, but it appears to be no more than enough for the ordinary conditions of the new buildings, and should be increased, if possible, for such situations as that of the Columbus.

(7.) *Lights.* — Nine chain pendant electric fixtures on three switches. No gas.

(8.) *Heating and Ventilation.* — The inlet for heat about 5 square feet, the outlet for ventilation about 5 square feet for gravity system and 3 square feet for fan.

(9.) *Bookcase.* — Provide a bookcase in any convenient position, capable of containing 300 octavo volumes; upper doors fitted with pin tumbler locks, and latch and knob; drawers fitted with pin tumbler locks and small brass knobs. Lower doors to have pin tumbler locks; same lock in each bookcase; all bookcase locks master-keyed. (See drawing.) Special equipment for care of books where school is day and evening is described on page 20 (600 volumes in bookcases for upper grades).

(10.) *Map Supports.* — Provide one map support for each class-room in Grades IV., V., VI., VII., and VIII., preferably behind the teacher's desk or opposite the windows, fixed. (See drawing.)

(11.) *Teacher's Closet.* — Proyide a small closet for teacher's coat and hat, preferably opening from the class-room, but allowable from the wardrobe.

* WARDROBES. (1.) *Size.* — Wardrobes will adjoin school-rooms and be from 4 feet 6 inches to 5 feet wide.

(2 and 3.) *Windows and Doors.* — Outside light; two doors, both connecting with school-room and not to corridor, and having no thresholds. Doors, double swung, 2 feet 6 inches wide, brass double acting butts, foot and hand plates, hooks or adjustable stops to hold open, ventilation under door farthest from vent.

(4.) *Floors* as in corridors, terazzo.

(5.) *Walls.* — Painted burlap up to hook rail; poles on brass-plated iron brackets with hooks under and pins over, 44 in number. Shoe rack and umbrella clip below. (See drawing.) Walls above, plaster, tinted. Height of lower pole, kindergarten, 30 inches from floor; lower grades, 36 inches to 40 inches; upper grades, 44 inches, 48 inches and 52 inches; distance between poles, 8 inches for elementary, 12 inches for high schools.

* A suggestion in regard to wardrobes comes from Chicago, and is embodied in a description of Mr. Perkins' recent plans. (See Report, 1906–1907.) The Trustees of the Franklin Fund are testing this in the Franklin Union.

Pins and hooks, 8 inches to 12 inches on centres for elementary and 16 inches to 18 inches for high.

(6.) *Ceiling.* — Plaster. No tint.

(7.) *Light.* — One lamp. Ceiling outlets, electric.

(8.) *Heating and Ventilation.* — Heating, direct. Ventilation, direct, $1\frac{3}{4}$ square feet area cross section.

CORRIDORS AND VESTIBULES.

(1.) *Size.* — Not less than 8 feet wide for four rooms on a floor; not less than 10 feet for over four rooms, governed by length, access to stairs, etc.

(2.) *Windows.* — Outside light essential.

(3.) *Doors.* — Main outer doors to open out, heavy butts, standard, master-keyed, school lock; door check; heavy hooks to hold open. Vestibule doors open out, heavy butts, pulls, push plates, hooks to hold open, door checks, no locks. Outer doors to basement open out, and fitted with standard latch lock. Other hardware as above.

(4.) *Floors.* — Terazzo or granolithic.

(5 and 6.) *Walls and Ceilings.* — Painted burlap, 7 feet high, untinted walls and ceilings. Finish burlap with painted line or a dado cap, and put picture moulding at ceiling in corridors.

(7.) *Light.* — Ceiling or short pendant fixtures (electric) 32 c. p. each, also gas for emergency in corridors, on stairs and in vestibules.

(8.) *Heating and Ventilation.* — Heat, direct. No ventilation.

(9.) *Sinks and Closets.* — On each floor above the first one or two 4-foot sinks, and emergency closets, one for boys and one for girls.

STAIRCASES.

(1.) *Number and Arrangement.* — Determined by building laws, but fireproof construction in all cases and not over five feet wide.

(2.) *Material.* — The treads, North River stone on iron string, or concrete construction with granolithic surface. Rails of a simple pattern, easily cleaned; wall rails not necessary.*

(3.) *Steps.* — About $6\frac{1}{2}$ or 7 inches by 10. Rail not less than 2 feet 8 inches on runs and 3 feet on landings.

SANITARIES.

(1.) *Size.* — General toilet-rooms in basement, in size approximating space for 2.25

* In many schools the children are required to file in the centre of the stairs and to keep away from the walls. Where this is the rule a rail on the wall appears needless.

water-closets for each school-room, .75 girls', 1.5 boys', and 33 inches of urinal for every school-room, arranged for convenient supervision and circulation.* Slate sinks, length from 10 inches per class-room in small buildings to 6 inches per class-room in large buildings, located preferably in the playrooms. The above refers to mixed schools.

(2.) *Windows.*—Ample outside light; glazed where exposed to view outside with factory ribbed glass.

(3.) *Doors.* — The doors arranged "in" and "out," with spring or door check and stout brass hooks to hold open; glazed with ribbed glass; half-doors to water-closets except where ordered omitted.

(4.) *Floors.* — Asphalt. Boys' drained to urinal, girls' to floor-wash.

(5.) *Walls.* — Salt-glazed brick, or other non-porous, inexpensive surface, 7 feet high; above, brick painted.

(6.) *Ceiling.* — Untinted plaster or whitewashed concrete. No basement ceiling need be furred level.

(7.) *Light.* — Ceiling or short pendant electric fixtures.

(8.) *Heat and Ventilation.* — Heat direct. Ventilation through fixtures, back of urinals, and 10 square inches local vent from each water-closet.

MASTER'S AND TEACHERS' ROOMS.

(1.) In each school of the upper grades, a room of about 240 square feet for the master, with a water-closet and bowl and a book-closet adjoining. This room should be near the centre of the building, *i.e.*, on the second floor in a three-story building, In all schools, a room or rooms for teachers, averaging about 300 square feet for ten teachers, with one water-closet and bowl for each ten.

(2.) Where men as well as women are teachers, a separate room with toilet accommodations for men.

(3.) Opportunity in teachers' rooms for warming luncheon, either gas or electric.

PLAYROOMS.

(1.) All free basement space to be arranged as playrooms for boys and girls. Salt-glazed brick, 7 feet high, and painted or whitewashed brick or stone walls above. Asphalt or grano-

*Inquiries have been addressed to principals of all schools where water-closets and urinals have been installed on this basis, and the concensus of opinion appears to be that the number cannot be reduced without inconvenience, but that it is satisfactory as it stands.

lithic floors, drained to floor washes, plaster ceilings or whitewashed concrete.

PLUMBING FIXTURES.

(1.) *Water-closets.* — The basement water-closets for elementary schools are short hopper closets; elsewhere, a heavy washdown closet. (See drawing.)

(2.) *Slate Partitions.* — Any sound, close-grained slate, black, green or purple, supported at ends with iron pipe about 8 feet high, tied together and to the wall, to which doors are hung. (See drawing.)

(3.) *Urinals.* — The urinals will be of slate, floor slab, trough and back, without partitions, flushed automatically through $\frac{7}{8}$-inch perforated pipe, with cold water; vented at bottom into space behind. (See drawing.)

(4.) *Sinks,* of black slate, self-closing cocks, set 15 inches on centres, and cup-hooks at each side of cocks.

(5.) *Floor Washes* in sanitaries and play-rooms as already mentioned. (See drawing.)

(6.) *Piping.* — (*a.*) Cast iron must be laid on foundations in basement, cleanouts at every change of direction. Soils and vents exposed as far as possible, no asphaltum, but oil-tested, red lead and three coats of paint.

(*b.*) *Supplies.* — Exposed as far as possible; where covered may be plain brass, elsewhere polished brass; no nickle-plate. Hot water for janitor's use in basement, cooking-room, and, if convenient, for master's and teachers' rooms. Supply from boiler and from summer boiler, if any, or from a gas heater, or from cooking-room range.

(*c.*) *Fire Lines.* — In first class buildings over 3 stories high, one or more lines of 3-inch pipe.

SPECIAL ROOMS.

ASSEMBLY HALLS.

(1.) Assembly halls should accommodate from 400 to 800. It has been found to be extravagant to seat the full number of pupils. The floor to be level and of wood like class-rooms. The windows to be fitted with rebated mouldings to take black shades, and so designed as to make the application of shades practical and simple. The platform should be capable of accommodating one, or, in the large schools, two classes, and should have removable stepped platforms of wood to take the benches. Galleries may be used where the hall is two stories in height. Anterooms near the platform are

desirable, and a connection from adjoining class-rooms to the anterooms or directly to the platform. A dignified architectural treatment of the walls and a studied color scheme is expected. The lighting, acoustics and exits should be such as belong to a small lecture hall. Artificial lighting to be under control from at least two points, one of which must be near an exit. Electric outlet for 30 ampere projection lantern, 25 feet from curtain. Provide recess in ceiling over platform for spring rolled curtain 13 feet long.

MANUAL TRAINING ROOMS.

(1.) *Size.* — Room, generally located in basement, should be approximately of dimensions equivalent to a class-room and its wardrobe, preferably a corner room; and arrangement, shown by drawing, for number of benches there given, 28.

(2.) *Light.* — The windows should be as near full length as possible, and on two sides. Artificial light in chain pendant electric fixtures, one fixture to every 4 benches.

(3.) *Floors.* — Of wood.

(4.) *Walls.* — A basement room should be finished as a shop; salt-glazed brick up to 7 feet where exposed, and above blackboard space of about 15 running feet, 4 feet high, and above this brick walls whitewashed. If above basement, finished as a class-room.

(5.) *Ceilings.* — Like basement.

(6.) *Heating and Ventilation.* — The same as in class-rooms.

(7.) *Fittings.* — (*a.*) *Stock-room.* — Stock-room should contain at least 80 square feet, preferably long and narrow. Two 18-inch shelves should run around the room, 5 feet 6 inches and 6 feet from the floor.

(*b.*) *Wardrobes.* — Wall space for 30 double coat and hat hooks, not necessarily a separate room.

(*c.*) *Teachers' Closet.* — Teachers' closet should be large enough to be used also for storage of finished work, and should be fitted with all shelving possible as well as with the customary coat-hooks. An area of 40 square feet is adequate.

(*d.*) *Bookcases.* — Like those in class-rooms, 150 capacity.

(*e.*) *Work-rack.* — About 28 feet long, 6 feet 6 inches high, and 2 feet deep. (For all of these see drawings.)

(*f.*) *Wash-bowl.* — A 3-foot sink is a convenience, but not a necessity.

(*g.*) *Furniture.* — (Not included in the building contract.) The furniture comprises 28 benches and stools, 4 display frames about 6 feet long and 30 inches wide, demonstration steps and guard rail, teacher's desk, table 4 feet by 2½ feet with unfinished top, one desk chair and two common chairs. (See drawing. Lay these out on preliminary drawings).

COOKING-ROOM. (1.) *Size.* — Should have an area equivalent for class-room and its wardrobe, preferably a corner room on top floor and arrange for 28 stations.

(2.) *Light.* — Windows as a class-room, but not necessarily left hand; if located in a corner, from two sides. Artificial light as in a class-room.

(3.) *Walls.* — Above basement, similar to school-rooms, blackboards, 4 by 10 feet, back of teacher's desk. Walls painted in oils. A basement room may have salt-glazed brick walls up to 7 feet and painted brick above. (See drawings.)

(4.) *Floors.* — The floor of wood, except space occupied by ranges, which is tiled.

(5.) *Ceilings.* — Ceilings like basement, or if above basement painted in oil.

(6.) *Heat and Ventilation.* — Less heat is required than in a class-room, but the ventilation should be the same, with additional vent from the demonstration ranges.

(7.) *Fittings.*—(*a.*) *Wardrobes.* — Provision for 28 pupils, 30 double coat and hat hooks in separate lighted closet, and small teacher's closet.

(*b.*) *Work benches,* accommodating 28 pupils, fitted with compartment for utensils, bread-board, etc., a Bunsen burner with a hinged iron grill over it, set on aluminum plates at each station; benches arranged in the form of ellipse, or oblong, with access to centre from two sides; top of pine 26 inches wide; open underneath and supported on pipe standards. One section detached and fitted as a demonstration bench; a clear space of 4 feet all around. Dining table (furnished under another contract) is to be set in centre. (See drawings. Lay these out on preliminary drawings and include in final drawings and contract.)

(*c.*) *Dresser.* — Ten feet long, in 3 sections,

4 adjustable shelves and glazed sliding, or hinged, doors at top; one set of 3 drawers and 2 cupboards on lower part. A shelf should be put in each cupboard about 12 inches from top.

(*d.*) *Fuel-box.* — In 2 compartments, each about 24 inches square and 30 inches deep, with hinged lids; small shelf in one section. Accommodations in the main coal-room for a supply of range coal and kindling wood.

(*e.*) *Bookcase.* — Similar to those provided in class-room.

(*f.*) *Sink.* — Soapstone, 5 feet long; 2 cold and 2 hot-water cocks; soapstone drip shelves 24 inches long at each end of sink, and a small sink about 2 feet long with 1 hot and 1 cold water cock. Sinks should be near ranges.

(*g.*) *Hot-water Boiler.* — (See instructions in plumbing.)

(*h.*) *Coal and Gas Ranges.* — A six-hole coal range and a similar gas range with hood provided and set on a hearth previously mentioned.

(*i.*) *Refrigerator.* — Will be a part of the furniture. Furnished under another contract.

KINDERGARTEN. (1.) *Size.* — The rooms can be contained in the space of a class-room and wardrobe, but a slightly larger area is desirable. They comprise a large room, a small room, a supply closet. The large room should take a 16-foot circle, regulation lines painted on the floor, with at least 4 feet all around it. The small room, about 200 square feet.

(2.) *Light.* — Windows should be as in a class-room, if on a corner, on both sides. Exposure should be sunny. Artificial light of the class-room type, arranged for the different rooms.

(3.) *Doors.* — Wide doors should open from small room into large room.

(4.) *Floors.*—As in class-rooms, with painted lines as above.

(5.) *Walls.* — As in class-rooms, with blackboard as in lower grades.

(6.) *Ceilings.* — As in class-rooms.

(7.) *Heat and Ventilation.* — As in class-rooms.

(8.) *Fittings.* — (*a.*) *Wardrobe.* — Hooks for 60, arranged as in ordinary wardrobes.

(*b.*) *Teachers' Closet.* — For clothing of two or three teachers.

(*c.*) *Toilet-room.* — Immediately adjoining, with low-down seat and bowl or sink.

(*d.*) *Bookcase.* — As in lower grades.

NURSE'S ROOM. (1.) *Size.* — From 200 to 400 square feet, according to size of school.

(2.) *Windows.* — Outside light as in class-rooms.

(3.) *Shades.* — Set to roll from window-sill upward. Not in building contract.

(4.) *Doors.* — One door to corridor, as in class-rooms, marked "Nurse's room."

(5.) *Walls.* — Upper two-thirds plaster, smooth finish, round corners, painted with light green oil paint. Lower one-third to floor, glazed white tile.

(6.) *Floor.* — Terrazzo, like corridors.

(7.) *Heat and Ventilation* — As in class-rooms.

(8.) *Light.* — Artificial light as in class-rooms.

(9.) *Nurse's Closet for Supplies.* — Size 3 by 4; one shelf; 6 hooks for clothing.

(10.) *Bath Tub.* — Five-foot porcelain enamelled iron, hot and cold water, where requested by Superintendent of Nurses.

(11.) *Bowl.* — Porcelain, hot and cold water faucets to turn by foot pressure, *i.e.*, hospital pattern. Hot water must be available all the year.

(12.) *Fittings.*—(*a.*) *Cabinet.* — Oak finish, medical cabinet, adopted as standard by Schoolhouse Commission. (Not in building contract.)

(*b.*) *Stool.* — White enamel revolving stool. (Not in building contract.)

(*c.*) *Table.* — Dressing table, white enamel frame, glass top and shelf. Size 16 by 20, rubber crutch tips.

(*d.*) *Filing Case for Nurse's Records.* — Oak finish, to hold 1,000 cards, 4 by 6; lock and key; guide cards.

(*e.*) *Writing Table.* — Oak finish with drawer and lock; size, 20 by 30.

(*f.*) *Chair.* — Oak, to match table.

(*g.*) *Couch.* — Flat frame oak, canvas adjustable top.

(*h.*) *Mirror.* — Size 2½ by 3, set over bowl.

(*i.*) *Stove.* — Single burner gas or electric stove equipped with fireproof shelf and back. (Not in building contract.)

(*j.*) *Clock.* — Secondary clock.

HIGH SCHOOLS.

CLASS-ROOMS AND RECITATION-ROOMS.

High school class-rooms are laid out for classes of 36 or 42, generally the latter. A room, 26 feet by 32 feet, will accommodate 42 high school desks. The large class-rooms are to accommodate from 60 to 80 pupils; the larger number can be accommodated in a room 33 feet 8 inches by 43 feet. Recitation-rooms, which to a certain extent will be used also as class-rooms, should be about 16 by 26. These rooms, if equipped with continuous desks and seats as in a lecture-room, or with double desks, such as are to be used in the Charlestown High, would accommodate about 30 pupils each. Lay out desks in one room of each type on preliminary plans.

ASSEMBLY HALL.

For a high school would not differ materially from that already described for elementary schools.

MASTER'S AND TEACHERS' ROOMS.

For accommodation of the principal there should be an outer office, that is a waiting-room or reception-room, and an inner office; and rooms for both men and women teachers, which might well be concentrated in the neighborhood of the reception-room and the principal's room. The School Committee now have under consideration a change in the organization of high school teachers, which may require a modification of the arrangement of the offices.

CHEMISTRY.

The Rooms in General Required. — Laboratory, separate from lecture-room, may be used as recitation-room, but better to use lecture-room and keep laboratory free from desks and demonstration table. Lecture-room, separate from laboratory; but easy of access, may be used for recitation; in that case should have facilities for demonstration. Combined lecture-room for physics and chemistry admissible. Three rooms for administrative purposes, store-room for dry chemicals and apparatus, room for storage of liquid chemicals and preparation of re-agents, which may also be used as teacher's laboratory and an office.

CHEMICAL LABORATORY.

(1.) *Size.* — Should accommodate from forty to fifty pupils. Three sections of forty to fifty each should have accommodation for apparatus.

(2.) *Light.* — On two sides.

(3.) *Heating and Ventilation.* — On same basis as for class-rooms, but removal of gases should also be provided for by a hood, each compartment of which should be ventilated by 9-inch hole at top, venting into elbow or T of drain pipe, thence connected by drain pipe into main flue, in which should be a fan operated by a motor.

(4.) *Walls and Ceiling.* — Walls of brick ideal, but not generally feasible, except on outside walls; plaster walls painted in oils and ceiling of plaster, covered with water resisting surface containing no lead. All woodwork to have natural finish, except tops of desks.

(5). *Floor.* — Preferably of concrete; may be of hardwood in narrow strips, filled in by asphalt; should slope very slightly between desks, interspaces again trending to common corner, which may be drained.

(6.) *Equipment.* — Working desks at right angles to greater length of room, in sections back to back between windows; section movable when top is removed. Each section 21 feet to 24 feet 6 inches long, 2 feet wide, 3 feet to 3 feet 2 inches in height. Distance between double sections about 5 feet, same distance at least between ends of sections and hood, which should be opposite longer line of windows and at right angles to direction of desk sections. Other ends of sections near enough to wall to allow for drain at right angles to sections and under windows. Desks to be of ash or any durable wood, natural finish. Top of narrow pine strips, treated with aniline black and waterproof lead finish. Individual desks provided with 3 lockers and 3 sets of drawers each, each set of drawers operated by bar from locker, combination lock to fasten locker. Each double section of desks provided with soapstone sink, placed between sections and flush with section top, which should slope slightly to sink.* Sink 8 inches at least wide, and should begin within 1 foot of the end toward hood, depth here to be 6 inches, running nearly to other end, where depth should be 8 inches. Each pupil to have working space of 3 feet 6 inches by 1 foot 8 inches. Each double section of desks provided with

* Individual sinks are preferred by the teachers, although the long trough is apparently adequate for teaching elementary chemistry, and is less expensive.

shelf for re-agents, running length of desk, 10 inches to 12 inches above desk, supported by metal standards at suitable intervals, of white wood, $1\frac{1}{4}$ inches thick, 9 inches wide, natural finish, covered with glass plates $\frac{1}{4}$ inch thick, 9 inches wide, suitable lengths, clamped to wooden shelf with as few clamps as possible. Wooden shelf at free end of each section, 1 inch to $1\frac{1}{2}$ inches thick, 3 feet to 4 feet long, not over 1 foot 3 inches wide, height of 2 feet 8 inches to 2 feet 10 inches, for holding blast lamps, re-agent jars, etc. Finish of top of shelf in aniline black. Floor space under second row of windows taken up with line of extra desks, built like sections, furnished in similar way, but without necessarily a drain, to be used for emergency or general utility. Wall space not otherwise occupied may be used for shelves or cabinets. Fixed slate blackboards at end opposite second set of windows and parallel to desk sections, sliding slate blackboards above hood. Liquid waste may be thrown into desk sink, dry waste into earthen jars. Hood should run at right angles to desk sections and along wall opposite free ends of sections. In the construction of hood, protection against fire should be considered. Should be built against brick wall. Floor of hoods to be of slate; wood, inside and outside, to be finished natural. Space divided into 3 or 4 compartments, closed by sliding windows. Space against wall not occupied by hood for general sink.

(7.) *Gas.* — Lead from gas main at free end of centre of double desk sections, branch into 2 leads along back of each section. Take-offs between each working desk space in form of pillar with two $\frac{1}{4}$-inch cocks, at each end desk a single cock. Two $\frac{1}{4}$-inch gas nipples at each side of each compartment of hood. Cocks of these outside of hood. Wall desk fitted with single gas taps at intervals of 2 feet.

(8.) *Water.* — Lead from water main at free end of centre of double desk sections. Size, large enough to fill section sink rapidly. Lead of ordinary size along length of section underside of shelf, take-off at free end of section, to which blast and suction pump may be attached. At junction of each four working desk spaces take-off, carrying two valves with

hose bibb delivery $\frac{3}{4}$-inch, the two valves or cocks facing opposite sides. Suction pump attached to these bibbs if desired.

(9.) *Drains.* — Section desk sink to have open drain and mercury arrestor, into which should be set movable concave netting of wide mesh to arrest larger solid matter. Main desk drain at right angles to sections along and under windows, between windows and sections should be in form of wooden trough, in sections dovetailed from 6 inches to 8 inches inside diameter and equally deep, covered with asphalt paint or filling; may be supported on brackets against wall and left open, or covered and provided with movable top. Into this drain will drip the lead pipes coming from section sink. Slate floor of each hood compartment should deepen slightly in centre, where there should be a hole 1 inch in diameter, into which is fitted short lead drain pipe, closed by perforated plug; drain pipes to be connected with sloping drain pipe, open or closed, running toward and delivering into general sink.

(10.) *Electricity.* — Current of electricity on section desks, need not exceed ten volts, may be supplied from source common to physical and chemical side. Plugs between each working space placed under desk top on frame.

LECTURE AND RECITATION ROOM.

(1.) *Size.* — Area to depend on number of seatings required or number of pupils in classes; should be large enough for two classes and should occupy a position between the laboratories for physics and chemistry.

(2.) *Light.* — As much glass area as class-room, preferably from left. Fit windows and other openings admitting light with dark curtains as specified under Assembly Hall. Electric lighting from the top, controlled at point convenient to demonstration table.

(3.) *Floor* stepped up in fireproof construction and finished in wood like floor.

(4.) *Heating and Ventilation.* — As for class-rooms, with extra ventilation to remove fumes. Space at left end of desk provided with register and flue of at least 10 inches diameter, to afford means of down draught. Flue carried under floor to nearest wall, flue and draught actuated by motor, if not sufficient.

(5.) *Equipment.* — Lecture table, not less than 12 feet long, not more than 3 feet, nor less than 30 inches wide, height 32 inches. Placed 4 feet distant from wall, material same as that of room, top made of pine plank and finished like chemical laboratory desks. Pneumatic sink at right hand of desk of soapstone in 2 depths. Not to exceed 30 inches long, 20 inches wide. Depth, 4 inches to 6 inches minimum; 16 inches to 18 inches maximum. Length of minimum depth not to exceed 60 per cent. of total length. Sink to be depressed in table and provided with flush cover. Sink to have screened drain with mercury trap and overflow. Supply hot and cold water under reduced pressure and cold water under street pressure for quick filling, 2 goosenecks with $\frac{3}{4}$-inch hose bibbs, to one of which combined blast and suction pump may be attached: steam supply direct from boiler main with a by-pass to summer boiler; supply gas air suction, and gas taps not exceeding 6 in number. Over demonstration table, secured to ceiling, provide a plank with heavy screw hooks. Behind lecture table provide sliding blackboards of not less than 50 square feet, and a canvas curtain on heavy spring roller for attaching charts. Drawers and closets for lesser lecture apparatus and chemicals in body of table, wall on either side provided with shelves for re-agent bottles under glass, and side wall provided with cabinets for larger pieces of permanent apparatus, if there is no special room for this. Lifting seats with desk for taking notes arranged on platforms, so that the successive tiers will rise one above the other to insure an unobstructed view of demonstration table. (See drawing.)

(6.) *Electricity.* — Provide three (3) forms of current, viz.: one circuit for direct current at 110 volts, 30 amperes, and one circuit for 5 to 20 volts, 50 amperes, and one circuit for alternating current at 110 volts, 30 amperes. Regulating rheostat for the 5 to 20 volt direct current to be located conveniently to table. A 50-ampere ammeter and a 125-volt voltmeter, both with extra large illuminated dials, mounted on swing brackets in full view of class and instructor; suitable means for switching ammeter and voltmeter to either circuit.

GROUNDS OF THE JEFFERSON SCHOOL.

Terminate circuits in non-reversible push plug receptacles. A projection lantern and receptacles for same at end of table and at rear of room. Lantern screen on spring roller at side of room, width of screen usually 12 feet, but dependent on distance and lenses used.

ADMINISTRATIVE FACILITIES.

(1.) *Apparatus Storeroom.* — Should give ample space for storage of extra and reserve apparatus, and original packages of stock chemicals. These should be kept in dust-proof cabinets with glass doors and in drawers.

(2.) *Preparation Room.* — This should adjoin the above. Primarily for storage of liquid chemicals in bulk and preparation of liquid re-agents, and storage of supply bottles, also fitted for teacher's laboratory. Should have wide centre table with gas in centre, working desks, with drawers and closets along two sides, also gas, water, sink, blast, suction, steam and electricity. Shelves along desks for storage of liquid chemicals, supply bottles and smaller re-agent bottles. An adequate hood should be provided.

(3.) *Office and Balance Room.* — Adjoining storeroom and preparation room should be small room to contain desk, book shelves, table, and a good grade balance.

PHYSICAL LABORATORY.

(1.) *Size.* — In a space about 30 by 40 feet. A laboratory, apparatus-room, and shop.

(2.) *Light.* — The same basis as for class-rooms, one wall having as direct a southern exposure as possible for *porte lumiere* studies. Artificial light, as in a class-room. Dark curtains in addition to regular shades for darkening room. Windows and all openings admitting light fitted, as specified under Assembly Hall (p. 31).

(3.) *Heating and Ventilation.* — On same general basis as for class-rooms.

(4.) *Equipment.* — Small laboratory tables to accommodate two or four pupils at each, built of hard wood, cherry tops, fitted with 4 drawers, supports and adjustable cross-bar. Wall tables around room on sides where there are windows, with one or two shallow drawers under, but not deep enough to interfere with comfort of pupil. Soapstone drip sinks with cold water to be provided at these tables, one to every six or eight pupils. Instructor's table, fitted with hot and cold water, Richards

pump, numerous cupboards and drawers of various depths and widths. Two-inch plank bolted to ceiling over this table, with space of 2 or 3 inches between plank and ceiling, for attachment of pendulums and other apparatus. Provide electric outlet for stereopticon and screen for same.

(5.) *Furniture.* — Provide adjustable stools for all the tables and a sufficient number of tablet arm chairs to accommodate the entire division during demonstration exercises. Chairs to be placed in rectangle formed by pupils' tables and demonstration table. These are not in building contract, but to be laid out on preliminary plans.

(6.) *Electricity.*— One outlet for direct current at 110 volts E. M. F. and 30-ampere capacity. One outlet for direct current at low voltage with regulator conveniently located. One outlet for alternating current at 110 volts E. M. F. and 30-ampere capacity. One outlet for each kind of current at demonstration table, to be single pole push plugs instead of binding posts. Series and multiple connections at each pupil's table. Switch in laboratory to cut out pupils' tables.

(7.) *Gas.* — Pupils' tables to be equipped with gas, 4 cocks to each table. Wall tables to be equipped with gas. Demonstration table to be provided with gas.

(8.) *Bulletin Board.*— 25 to 50 square feet of bulletin board covered with burlap, secured at edges, but not glued on like wall paper.

(9.) *Blackboards.* — As much blackboard space as possible. Sliding blackboards back of demonstration tables.

APPARATUS ROOMS.

(1.) *Size.* — One large or several small rooms, to open directly out of laboratory, and connected with lecture-room.

(2.) *Equipment.* — To be fitted with dust-tight cases with adjustable shelves and sliding glass doors, extending not higher than a man's reach; cabinets of drawers of various widths and depths, mostly narrow and shallow. Some of these cases may be in the laboratory, if there is sufficient wall space. A small sink and hood should be provided.

SHOP.

A small shop is desirable, though not absolutely necessary. This should be equipped with work-bench, power lathe, belted to motor

generator, and shelving for tools and stock, and may be set up in apparatus room.

BOTANICAL AND ZOOLOGICAL LABORATORY.

(1.) *Size.* — In a space about 30 by 40 feet. Laboratory and apparatus room.

(2.) *Light.* — Windows the same as for class-rooms, one wall with southern exposure. Artificial light as in class-rooms.

(3.) *Furniture.* — Forty-two adjustable screw revolving chairs.

(4.) *Equipment.* — Twenty-one pupils' tables 54 inches by 24 inches by 30 inches high, each to accommodate two pupils, to have plate glass tops. Soapstone sink, 72 inches by 30 inches, 10 inches deep, accessible on all sides. Supply with cold water, about 8 bibbs, and 2 hose bibb cocks. One aquarium, 30 inches long, 20 inches wide and 20 inches high, with supply, gooseneck cock with aspirator and standing waste. Ice chest, 36 inches by 24 inches. Cases built wherever practicable. Three sections to contain 42 pigeon holes, 3 inches by 3 inches by 8 inches, for storage of instruments. A liberal supply of cases to contain drawers and cupboards in lower compartment, and shelves above for exhibition of specimens, storage of material, instruments, books, charts, etc.

GYMNASIUM AND DRILL HALL.

(1.) To be used in common for gymnasium exercises, athletic games, and the drilling of the school cadets. On account of its size and for structural conditions, to be generally located in the basement, directly under the assembly hall, with clear span of ceiling and combined height of basement and first story, with visitors' gallery generally provided at one end at same grade and entered from first floor.

(2.) *Size.* — The classes exercising in the gymnasium are generally about 50, and a suitable floor space for this number as well as floor space for a full company of cadets at drill is from 3,000 to 3,850 square feet. The height should not be less than 24 feet.

(3.) *Light.* — Ample outside light in all cases. Electric light from ceiling.

(4.) *Heat and Ventilation.* — The former sufficient to guarantee a temperature of about 60 degrees, and about twice as much ventilation as is customary for the ordinary class-room. This is, of course, insufficient for the number of people who might occasionally

occupy the gymnasium for exhibitions, but it is more than enough for the ordinary number using it for class exercises.

(5.) *Equipment.* — The gymnastic apparatus consists of the following fixtures, which are slightly modified in the different schools:

25 Bar stalls.
25 Bar stall benches.
4 Double booms.
4 Saddles.
20 Vertical ropes.
2 Inclined ropes.
2 Rope ladders.
5 Serpentine ladders.
2 Vertical ladders.
3 Horizontal ladders.
2 Boxes, 1 horse, 1 buck.
12 Balance boards.
2 4 by 7 mats.
2 5 by 10 mats.
4 Pairs jumping standards and ropes.
4 Inclined planes.
6 Travelling rings.
1 Pair basket ball goals.
3 Basket balls.
4 4-lb. medicine balls.
16 2-lb. medicine balls.
24 Small rubber balls, $2\frac{1}{2}$ to 3 in. in diameter.
8 Indoor baseballs.
1 Fairbanks scale.
1 Water spirometer.
1 Tape measure.
1 Dozen glass mouthpieces.
24 Bean bags.
1 Truck to carry mats.
1 Storming board.
6 Pairs $1\frac{1}{2}$-lb. Indian clubs.
40 Pairs $\frac{3}{4}$-lb. Indian clubs.
8 Chest weights.
1 Horizontal and vaulting bar.
1 Pair parallel bars.
2 Jump boards.
1 Shoulder caliper.

(6.) *Gun Racks.* — Racks for holding the guns carried by the cadets should be provided on wall. These racks should be protected by locked doors.

(7.) *Special Rooms.* — Adjoining gymnasium and drill hall two small rooms about 10 feet square should be provided for school matron and director of gymnasium.

(8.) *Dressing Rooms, Baths and Lockers.* — (*a.*) In the high schools under construction the Board is experimenting with the following system, which has been tried with success in

many outside gymnasiums. This consists in keeping all the clothing of all the pupils in a central locker room, each set being numbered and all being under the control of the attendant in charge. Dressing-rooms are provided in a number equivalent to the number of a class. A class coming for exercise is given their gymnasium clothing and keys to dressing-rooms, which they lock behind them when exercising. Returning, they can be given the opportunity to take a shower bath in a large room fitted with individual showers, arranged in three banks for different temperatures, all turned on at once by the attendant if a class as a whole is bathing. Returning, the class give up the keys, but leave their gymnasium clothing to be gathered up by the attendant. The clothing is carried to the dry-room, and when dried each set is put dack in its proper pigeon hole.

(*b.*) The locker-room contains pigeon holes, 10-inch cube, one for each pupil in the school, in a room completely controlled by the attendant. Beside this there is a counter over which to deliver the clothing, and adjoining this the dry-room, capable of being heated to a high temperature and thoroughly ventilated.

(*c.*) The dressing-rooms are small cabins, about 3 feet square, with a locked door, a seat and hooks. The shower baths are 3 feet square divided by slate partitions, similar to those for water-closets, each having a bar at the front, over which a cotton sheet can be dropped. Each compartment has two sprays in opposite corners.

HANDICRAFT ROOMS.

On account of the varying needs of different localities it seems unwise to have a uniform course in manual training in high schools. With this in mind, the following minimum equipment is suggested, to be added to as special occasions arise:

(1.) *Size.*— A space 30 by 40 feet appears to be ample for this work.

(2.) *Light.* — Windows and artificial light as for a class-room.

(3.) *Equipment.* — Twenty 36-inch manual training benches fitted with 2 vises, 1 to be a quick action iron vise; wall bench fitted with 10 stations; 10 Prentiss iron vises, $3\frac{1}{2}$-inch jaw;

10 tool drawers and 5 Bowers tool holders; 1 pair Federal bench shears; $\frac{1}{4}$-inch gas hose cock terminal above each bench station; 2 gas blast burners, 1 large, 1 small; the blast burners and blow pipes to be accompanied by metal tray and ventilating hood; bench drill; metal beating anvils according to approved patterns; sink; polishing lathe and bench No. 1 C, 4 by 28-inch grindstone mounted in iron trough; speed lathe, 8-inch single arbor; 8-inch bench saw; these four run by power; cases for work in process, instruments, etc., room for storage of lumber and other supplies. (This is all tentative.)

HOUSEHOLD SCIENCE.

(1.) *Size.* — The space should be about 30 by 40 feet, and should accommodate the kitchen, two small rooms for showing the care of a dining-room and of a bedroom, and a china-closet and pantry.

(2.) *Light, Heat, etc.* — The same as that for other rooms, with additional ventilation in the kitchen.

(3.) *Equipment.* — The kitchen to contain the same equipment as that for grammar school cooking-rooms, but for 24 stations only; a kitchen pantry fitted with shelving and a china-closet fitted with a sink; drawers, cupboards and shelves enclosed with glass doors. The dining-room and bedroom simply finished rooms, having no equipment except the furniture.

DRAWING–ROOM.

(1.) *Size.* — The size should be about 30 by 40, and is preferably divided into two drawing-rooms with a work-room between.

(2.) *Light.* — Light preferably from the north. This is not a necessity except for the room in which drawing is done from models.

(3.) *Equipment.* — Will include cases for drawing boards, for models and stock, and a bookcase, the details of which are given in Appendix XII.; a small sink, with hot and cold water.

LUNCH–ROOM.

(1.) The lunch-room equipment in high schools will depend largely upon the location of the school. If the pupils come from a distance and a large proportion of them stay for the noon hour, the Board puts in a lunch counter, equipped so that simple food can be served hot and fitted with conveniences for washing up. This is generally managed by arrangement with outside caterers.

LIBRARY.

(1.) A space equivalent to a small class-room is ample for library purposes. The book accommodation will depend somewhat on the size of the school. The library is planned as a reading-room, that is, with the books in the room and not in a separate stack-room.

WARDROBES.

(1.) In high schools a common wardrobe is advised for all the clothing, situated on the lower floor to avoid bringing dirt into the upper floors. There being an attendant on the lower floor, the room as a whole can be locked up.

(2.) *Light.* — The room should have outside light.

(3.) *Heat and Ventilation.* — It should be thoroughly well heated and ventilated.

(4.) *Equipment.* — The poles, hooks, etc., will be similar to those used in the other schools.

HEATING, VENTILATION AND ELECTRIC SYSTEMS.

HEATING AND VENTILATION GRAVITY SYSTEM.

(1.) *Heat-ducts for School-rooms.*

(*a.*) *Location.* — In a corner room, locate the duct within 10 feet of the outside wall. In a room with one outside wall, locate the duct on the inside wall, near the middle.

(*b.*) *Size.* — Allow one square foot area of duct for each nine occupants. The opening into the room is to be the same area as the duct. The bottom of the opening is to be about 8 feet above the floor. Galvanized-iron deflectors, painted to match the adjoining walls, will be placed in each opening. In addition, there will be a galvanized-iron ground around the opening.

(2.) *Vent-ducts for School-rooms.*

(*a.*) *Location.* — In a corner room, locate the duct at the inside corner of the room, and where possible on the same wall as the heat-duct. In a room with one outside wall, the duct is to be on the same inside wall as the heat-duct, and as near the middle as possible.

(*b.*) *Size.* — Allow about one square foot area of duct for each ten occupants. The opening into the room will be at the floor, and will be the full size of the vent-duct. There will be no guard at the opening. The floor will be carried into the bottom of the duct, and the baseboard will be carried in and around. The inside of the duct, exposed to view, will be plastered and finished to match the adjoining walls.

PLENUM FAN SYSTEM.

(1.) *Heat-ducts for School-rooms.*

(*a.*) *Location.* — In a corner room, locate the duct within ten feet of the outside wall. In a room with one outside wall, locate the duct on the inside wall, near the middle.

(*b.*) *Size.* — Allow one square foot area of duct for each fourteen occupants. The opening into the room is to be one-third larger than the area of the duct. The bottom of the opening is to be about eight feet above the floor. Galvanized-iron deflectors, painted to match the adjoining walls, will be placed in each opening. In addition, there will be a galvanized-iron ground around the opening.

(2.) *Vent-ducts for School-rooms.*

(*a.*) *Location.* — The location and size will be the same as those for the Gravity System.

EXHAUST FAN SYSTEM.

(1.) *Vent-ducts for School-rooms.*

(*a.*) *Size.* — Allow about one square foot area for each sixteen occupants. The other details will be the same as for the Plenum Fan System.

TOILET-ROOM. VENTS.

(1.) *Duct.* — Allow 10 square inches of duct area for each closet and for each 16 inches in length of urinal space.

(2.) *Opening.* — Each door into the toilet-room is to have an opening either in the lower panel with a register face on each side or underneath the door. The net area through the opening in either case is to be equal to the area of the main vent-duct from the room.

WARDROBE VENTS.

(1.) **Duct.* — Each wardrobe is to have a vent-duct with an area of $1\frac{2}{3}$ square feet and having registers at the top and bottom of the room.

(2.) *Opening.* — The door leading into the wardrobe at the end farthest from the vent-duct is to have an opening similar to that for a toilet-room so that the air can pass from the school-room into the wardrobe and thence out through the duct.

ELECTRIC WORK.

(1.) *Service.* — This should enter basement underground at location to be determined by reference to street mains, and should terminate on a switchboard located in a fireproof closet, opening if possible into the basement corridor.

(2.) *Conduits.* — All wires to be run in an iron conduit concealed, except conduits for

* This would be modified if the Chicago system of wardrobes is adopted.

mains in basement, and side outlets in boiler, engine and stack-rooms. Tap circuit conduits to be run above rough floor wherever possible. If floor construction will not allow this they are to run below floor beams and above ceiling, a space of 2 inches being left in which they can be run.

(3.) *Wire Slot.* — Near each end of a large building, or near the centre of a small one, either an open shaft at least 24 inches by 30 inches, or a slot in wall 4 inches deep and 18 inches wide, should be provided from a point 4 feet below basement ceiling to a point above ceiling of top floor.

(4.) *Cabinets.* — All cabinets to be furnished by wiring contractor, but finished by the general contractor.

(5.) *Cutting.* — All cutting and patching to be done by the general contractor.

(6.) *Outlets.* — Class-rooms to be provided with 6 four-light ceiling outlets, controlled by two switches, and one light for teacher. Wardrobes to have 1 two-light ceiling outlet, controlled by switch in class-room. Corridors to be lighted from ceiling wherever possible. Height of side outlets in rooms to be 6 feet, and in corridors 6 feet 4 inches. Switch outlets to be 4 feet. Switches in corridors, playrooms, and pupils' toilet-rooms to be operated by private key.

(7.) *Fixtures.* — Fixtures in class-rooms to be of special design to combine a direct and diffused light. (See Appendix VIII.)

(8.) *Gas.* — Gas outlets to be provided in all corridors, vestibules, stairways, boiler-room and assembiy hall exits; all except vestibule to be wall outlets. Gas-piping to be included in the Engineer's work.

(9.) *Stereopticon.* — All grammar halls and high schools to be provided with an electric stereopticon and reflectoscope.

(10.) *Clocks and Bells.* — All schools to be provided with a system of clocks, operated by a master clock. All primary schools to be provided with a system of signal bells, operated by push buttons. In all grammar and high schools the bell system to be operated automatically by master clock, according to prearranged programme.

(11.) *Telephones.* —In all schools, each

class-room, hall, teachers' room and boiler-room to be connected to master's office, or to room occupied by the first assistant, by a telephone system.

NOTE.—Drawings showing special fittings for both plumbing and interior fittings will be found in Appendices XI., XII., and XIII.

VI.

FINANCIAL STATEMENT.

As stated in the report last year, the original appropriations amounting to seven millions have been practically exhausted by the completion of the Charlestown High and the Normal and Girls' Latin Group. The balance, if any, will be taken for the purchase of land in the Agassiz and Robert G. Shaw districts. The appropriation of 1907 was for the following items:

Item No. 1. — Agassiz District, elementary school, upper grades	$62,000
Item No. 2. — Wells District, elementary school, lower grades	50,000
Item No. 3. — Bennett District, elementary school, lower grades	15,000
Item No. 4. — Adams District, elementary school, lower grades	15,000
Item No. 5. — Prince District, high school, Mechanic Arts High	500,000
Item No. 6. — Phillips District, elementary school, upper grades	358,000
	$1,000,000

With the exception of Item 6, the Phillips District, this work is in hand. No action has been taken in the Phillips District, owing to reasons already given. If next year it is found possible to locate this school on the Embankment, it will mean the saving of a very large sum of money, which will thus be made available for other purposes.

The appropriation for 1908 will cover chiefly elementary needs, and it is hoped that the development of the high school needs, more especially those covering commercial and technical instruction, will be met by the appropriation or by the sale of property in the year following.

With the passage of chapter 450 of the Acts of 1907, the Board has now a permanent policy established and can count upon a definite annual sum for new buildings, one million for 1907, one million for 1908, and thereafter five hundred thousand annually.

VII.

CONCLUSION.

The standards of cost and accommodation will undoubtedly be modified by the new regulation reducing the size of the class-rooms, but the Board has not yet received the figures on any new building to enable it to arrive at any new basis. It is, however, believed that with increased knowledge as to the methods of planning and executing economically the price per pupil will not materially increase, although the buildings are improved by the reduction in size of the rooms. The Board has not attempted yet to try the Chicago wardrobe system, but will probably test this at an early date.

The Board owes much to the architects that have worked for it, but if the policy continues of constantly employing new men it would be better for the Board to undertake its own architectural work. This would increase the cost of running the department, but would probably materially lessen the cost of this architectural service to the City of Boston.

The relation of the Board with its contractors has been unchanged. It is impossible to expect the best class of contractors to figure for the city where the margin of profit is so small, and among those who do figure the temptation to combine and keep the margin of profit above that which would be left by ruinous competition is very strong. The investigation of the Finance Commission has shown that at times contractors have yielded to this temptation, but the Board believes that even under these circumstances the prices the city has paid have on the whole been below the prices of similar work done for corporations, individuals, or other cities. Ii has been the custom of the Board to give preference, in the small repair work (of twenty dollars or under), to those firms who are constantly figuring in competition on the larger work, that is, jobs that run from one hundred dollars up. The checking of these small repair items is extremely difficult, and must depend largely on the integrity of the men concerned, chiefly of the contractor and the inspector, as the enormous mass of detail makes it impossible for the commissioner who checks these bills to assure himself personally that the bill represents accurately the amount of labor and material.

As noted in previous reports, the Board believes it will be a distinct gain if certain fixed sums can be put into the hands of the masters, to be expended for these petty repairs, which, quite irrespective of the possibility of unjust charges, will cost

more in the time of the Board's employees than the actual work warrants. No practical way of doing this has yet been devised.

The Board has this year been greatly assisted in its work by the active coöperation of the School Committee, of the superintendent and of the assistant superintendents. Without question the new systems inaugurated by the School Committee and carried out by the superintendent have worked greatly to the advantage of the work conducted by this Board. A definite policy of construction has been settled in advance, the needs of accommodation have been carefully and critically studied, and the work has been advanced on well considered lines. All of this makes for the efficiency of the Board. We trust that in the future the work will be carried out to the satisfaction of your Honor.

Respectfully submitted,

R. CLIPSTON STURGIS,
CHARLES LOGUE,
THOMAS A. MULLEN.

THE FRONT OF THE WILLIAM E. RUSSELL SCHOOL.

APPENDICES.

APPENDIX I.

APPROPRIATION FOR LAND AND BUILDINGS FOR SCHOOLS.

I.

GENERAL STATEMENT.

The following statement shows the expenditures on account of the above appropriation from February 1, 1907, to February 1, 1908:

February 1, 1907, balance of appropriation		$1,940,343 12
Expenditures.		
Expended for sanitation:		
Painting latrines		$81 10
Amount expended for fire protection:		
Fire extinguishers		156 00
Expended for sites, erecting, grading and planting of lots and furnishing new buildings:		
Charlestown High School:		
Building	$96,338 17	
Furnishing	13,289 05	
		109,627 22
Extension, Francis Parkman School:		
Site	$150 00	
Building	8,359 26	
		8,509 26
Extension, Mechanic Arts High School:		
Building		29,381 99
Normal and Latin School Group:		
Building	$504,501 20	
Furnishing	23,802 05	
Site	49 50	
		528,352 75
Carried forward		$676,108 32

Brought forward		$676,108 32
Grammar School, Dearborn District (Dearborn School) :		
Site		250 00
Grammar School, Edward Everett District :		
Site		14,376 60
Grammar School, Washington Allston District (Thomas Gardner School) :		
Building		146 53
Addition, Winchell School :		
Building	$48,674 69	
Furnishing . . .	2,895 17	
		51,569 86
Eliot School, Master's Office :		
Building		18 60
Elementary School, Adams District :		
Building	$7,566 78	
Furnishing . . .	1,047 25	
		8,614 53
Elementary School, Blackinton District :		
Building	$30 50	
Site	3,693 78	
		3,724 28
Elementary School, Dudley District :		
Site		27 90
Elementary School, Edward Everett District :		
Site		17,531 50
Elementary School, Longfellow District :		
Site		37 85
Elementary School, Phillips District (south of Cambridge street) :		
Site		25 80
Elementary School, Phillips District (north of Cambridge street) :		
Site		35 25
Elementary School, Robert G. Shaw District (Mt. Vernon street) :		
Site		5,555 94
Elementary School, Robert G. Shaw District (Germantown) :		
Site		36 45
High School of Commerce, Lewis District :		
Site		33 00
Addition, Hobart-street School :		
Site	$6,054 93	
Building	11,780 34	
Furniture	319 10	
		18,154 37
Carried forward		$796,246 78

Brought forward		$796,246 78
Manual Training School, Quincy District:		
Site	$6,000 00	
Building	10,027 57	
		16,027 57
Miscellaneous:		
Engineering expenses		2,864 86
Incidental expenses, including salaries, blue prints, engineer supplies, stationery, car fares and travelling expenses . . .		26,765 83
Total expenditures of 1907–08 . .		$841,905 04
Amount voted and set aside but not expended to date by Schoolhouse Commissioners for fire protection, engineering and office expenses, sites, construction and furnishing of new buildings		979,775 54
Balance of appropriation undistributed . .		118,662 54
		$1,940,343 12

II.

SUBDIVISION OF EXPENDITURES.

Land and Buildings for Schools, 1907–1908.

High Schools	$667,394 96
Elementary Schools	128,614 72
Manual Training School	16,027 57
Miscellaneous Expenses	29,867 79
Total expenditures	$841,905 04

III.

Statement of Income, Land and Buildings for Schools.

Amount received from collection of rents . .	$1,000 00
Total	$1,000 00

APPENDIX II.

APPROPRIATION FOR RENTALS, FURNITURE, REPAIRS, ALTERATIONS AND EXPENSES OF THE COMMISSION.

I.

GENERAL STATEMENT.

During the year February 1, 1907, to February 1, 1908, the following sums were expended by the Schoolhouse Department for furniture, repairs, alterations, rents and expenses of the commission:

February 1, 1907, appropriation		$330,300 00
General Repairs:		
Carpentry, lumber and hardware	$48,696 13	
Furniture	44,306 14	
Heating apparatus . .	33,327 93	
Painting and glazing . .	20,084 80	
Whitening and plastering .	17,885 69	
Roofing and gutters . .	17,280 00	
Salaries of inspectors . .	13,892 46	
Plumbing	13,105 78	
Masonry, paving and drains .	13,081 65	
Electric wiring and fixtures .	10,025 51	
Ventilation, galvanized iron work	6,748 36	
Grading yards, etc. . .	5,985 48	
Slate blackboards . . .	4,831 37	
Iron and wire work . .	4,783 35	
Rental and care auxiliary fire boxes	4,687 50	
Automobile expenses . .	4,434 55	
Blackboards, repairs of .	4,153 13	
Gas fitting and fixtures . .	3,181 89	
Electric bells and telephone systems	2,593 95	
Printing and postage . .	2,449 84	
Carried forward . .	$275,535 51	

Brought forward	$275,535 51	
Removing snow from roofs	2,311 80	
Electric clock systems	2,212 88	
Locksmithing	1,851 58	
Care and cleaning	1,701 99	
Planting and care of lawns	1,660 90	
Teaming	1,340 79	
Shoring buildings	1,241 25	
Horse keeping	1,118 60	
Car tickets and travelling expenses	853 50	
Flagstaffs and repairs	781 54	
Motors and engines	776 46	
Asphalting	569 00	
Gymnastic apparatus	345 93	
Janitors' supplies	260 15	
Rubber treads and matting	230 94	
Fire-hose and extinguisher charges	128 50	
Advertising, plans, etc.	42 23	
Fuel	19 20	
		$292,982 75
Administration Expenses:		
Salaries	$13,811 59	
Rental of office	2,100 00	
Furniture and repairs	1,562 82	
Care of office and electric light	1,106 80	
Telephone and messenger service	725 02	
Stationery and supplies	337 49	
		19,643 72
Rentals, etc.:		
Primary schools	$5,741 28	
High schools	4,859 75	
Kindergarten schools	4,493 00	
Grammar schools	1,933 00	
Cooking schools	306 50	
Manual training school	300 00	
Halls hired for graduating exercises	40 00	
		17,673 53
		$330,300 00

II.

SUBDIVISION OF EXPENDITURES.

Rents, salaries, furniture, repairs and alteration in school buildings, from February 1, 1907, to February 1, 1908:

Elementary schools	$236,939 97
Administration and incidental expenses	51,282 65
High schools	40,313 22
School Committee building	1,764 16
	$330,300 00

III.

SUBDIVISION AS TO SCHOOLS.

South End and Back Bay.

Appleton Street	$679 40	
Charles C. Perkins	1,194 46	
Common Building, Normal Group	10 00	
Cook	517 22	
Dwight	1,369 59	
English High	6,095 75	
Everett	1,761 91	
Franklin	3,564 43	
Girls' High	5,507 17	
Girls' Latin	3 50	
Horace Mann	1,586 31	
Joshua Bates	781 85	
Mechanic Arts High	1,342 37	
Normal (Rice Building)	211 83	
Prince	1,439 84	
Public Latin	2,987 43	
Rice	1,655 93	
Rutland Street	723 68	
West Concord Street	1,262 20	
		$32,694 87

City Proper.

Andrews	$1,660 50	
Brimmer	1,320 03	
Carver Street	21 84	
Pierpont	73 02	
Quincy	5,337 54	
Skinner	757 50	
Carried forward	$9,170 43	$32,694 87

Brought forward . .	$9,170 43	$32,694 87
Tyler Street	651 64	
Wait	849 71	
Way Street	340 67	
Winthrop	513 05	
		11,525 50
Baldwin	$1,267 19	
Bowdoin	1,397 70	
Christopher Columbus . .	1,447 43	
Cushman	2,437 85	
Eliot	1,272 41	
Emerson	637 08	
Freeman	977 53	
Grant	1,206 51	
Hancock	2,285 68	
Hancock Annex . . .	119 79	
Mayhew	586 39	
North Margin Street . .	149 88	
Phillips	747 27	
Paul Revere	1,853 05	
Pormort	896 56	
Sharp	1,446 96	
Somerset Street . . .	708 21	
Washington	3,956 77	
Wells	3,438 37	
Winchell	589 43	
		27,422 06

Roxbury, East of Columbus Avenue.

Aaron Davis	$1,123 19	
Abby W. May . . .	413 60	
Albert Palmer	550 09	
Asa Gray	1,137 22	
Bartlett Street	986 80	
Dearborn	1,049 10	
Dillaway	1,017 77	
Dudley	2,140 51	
Ellis Mendell	360 57	
George Putnam . . .	1,272 48	
George Putnam Annex . .	392 09	
George Street	1,550 06	
High School of Commerce .	2,877 28	
Howard Avenue . . .	761 31	
Howard Avenue Annex . .	178 00	
Hugh O'Brien	1,907 60	
Hugh O'Brien Annex . .	52 75	
Hull	514 60	
Hyde	1,681 08	
Carried forward . .	$19,966 10	$71,642 43

Brought forward	$19,966 10	$71,642 43
Lewis	3,403 94	
Lewis Annex	13 47	
Mt. Pleasant Avenue	147 86	
Miles Standish	616 35	
Nathaniel Hawthorne	273 36	
Old Dearborn	2,239 91	
Old Roxbury High	1,146 56	
Phillips Brooks	2,700 98	
Roxbury High	1,462 82	
Roxbury High Annex	31 50	
Samuel W. Mason	803 66	
Sarah J. Baker	781 28	
Sherwin	4,032 44	
Thornton Street	536 45	
W. L. P. Boardman	989 77	
William Bacon	671 42	
Williams	540 49	
		40,358 36

Roxbury, West of Columbus Avenue.

Comins	$4,840 65	
Cottage Place	774 03	
Farragut	475 66	
Heath Street	187 82	
Ira Allen	667 88	
Jefferson	1,836 93	
Lowell	1,489 51	
Lowell Annex	37 33	
Lucretia Crocker	472 98	
Martin	2,013 16	
Old Ira Allen (storehouse)	381 01	
Phillips Street	1,289 24	
Smith Street	55 03	
Wyman	236 25	
		14,757 48

Jamaica Plain and West Roxbury.

Agassiz	$1,594 54	
Baker Street	138 20	
Bowditch	794 46	
Canterbury Street	107 43	
Charles Sumner	1,223 34	
Chestnut Avenue	296 08	
Francis Parkman	658 11	
Florence Street	420 00	
Henry Vane	490 96	
Hillside	508 51	
Carried forward	$6,231 63	$126,758 27

Brought forward	$6,231 63	$126,758 27
Longfellow	695 01	
Margaret Fuller	249 40	
Mt. Vernon Street	718 95	
Old Agassiz	211 32	
Phineas Bates	158 33	
Robert G. Shaw	804 11	
Stephen M. Weld	335 52	
Washington Street (Forest Hills)	386 38	
Washington Street (Germantown)	184 73	
West Roxbury High	1,128 03	
		11,103 41

South Boston.

Benjamin Dean	$272 84	
Benjamin Pope	1,705 61	
Bigelow	1,607 40	
Capen	244 06	
Choate Burnham	149 11	
Clinch	1,506 41	
Cyrus Alger	564 43	
Drake	1,619 23	
Gaston	1,644 84	
Hawes Hall	896 35	
John A. Andrew	1,473 91	
John Boyle O'Reilly	354 61	
Lawrence	3,306 34	
Lincoln	1,107 99	
Norcross	888 27	
Old Parkman (storehouse)	659 91	
Oliver Hazard Perry	817 51	
Parkman	994 24	
Samuel G. Howe	2,309 35	
Shurtleff	1,740 87	
South Boston High	4,775 27	
Simonds	81 13	
Thomas N. Hart	2,362 50	
Tuckerman	211 39	
		31,293 57

Dorchester.

Adams Street	$306 20	
Atherton	1,104 92	
Benjamin Cushing	459 05	
Bailey Street	799 65	
Brewster	429 42	
Carried forward	$3,099 24	$169,155 25

Brought forward . .	$3,099 24	$169,155 25
Brewster Annex . . .	233 51	
Christopher Gibson . . .	1,315 65	
Dorchester Avenue . . .	515 38	
Dorchester High . . .	2,045 01	
Edward Everett . . .	1,019 58	
Elbridge Smith . . .	605 50	
Gilbert Stuart . . .	780 44	
Girls' High School of Practical Arts	4,213 33	
Glenway	72 60	
Glenway Annex . . .	14 90	
Harbor View Street . .	556 39	
Harris	624 11	
Henry L. Pierce . . .	2,060 44	
John Greenleaf Whittier . .	410 50	
Little Em'ly	9 20	
Lyceum Hall (storehouse) .	238 65	
Marshall	1,006 81	
Mary Hemenway . . .	4,165 49	
Mather	4,984 77	
Mayflower	6 60	
Minot	790 33	
Old Edward Everett . .	134 10	
Old Gibson	527 71	
Old Mather	828 51	
Oliver Wendell Holmes . .	1,059 46	
Quincy Street	736 52	
Roger Wolcott . . .	3,503 41	
Roger Clap	1,356 65	
Savin Hill	230 75	
Stoughton	493 19	
Thetford Avenue . . .	870 52	
Tileston	856 52	
Walnut Street . . .	928 20	
William E. Endicott . .	333 82	
William E. Russell . . .	918 56	
		41,546 35
Charlestown.		
Adams and Chestnut Street .	$472 16	
Bunker Hill Grammar . .	1,261 27	
Bunker Hill Primary . .	414 36	
Benjamin F. Tweed . .	298 36	
Charlestown High . . .	12 00	
City Hall (Charlestown Evening Drawing School) . .	2 83	
Common Street . . .	748 96	
Copley	2,531 63	
Carried forward . .	$5,741 57	$210,701 60

Brought forward	$5,741 57	$210,701 60
Frothingham	712 03	
Frothingham Annex	313 75	
Harvard	2,529 17	
Harvard Hill	717 69	
Mead Street	154 08	
Medford Street	252 86	
Polk Street	1,423 26	
Prescott	1,315 32	
Prescott Annex	23 50	
Warren	877 45	
William H. Kent	402 85	
		14,463 53

East Boston.

Adams	$1,582 65	
Austin	262 07	
Blackinton	1,041 13	
Chapman	1,666 87	
Cudworth	576 20	
East Boston High	759 91	
Emerson	1,671 61	
James Otis	785 89	
Lyman	2,410 51	
Noble	778 85	
Noble Annex	110 40	
Old East Boston High	170 20	
Paul Jones	1,044 92	
Plummer	346 64	
Tappan	1,398 21	
		14,606 06

Brighton.

Aberdeen	$398 21	
Auburn	670 31	
Bennett	1,227 80	
Bennett Annex	249 46	
Brighton High	1,344 36	
Everett	65 80	
Frederic A. Whitney	1,116 00	
Harvard	1,275 84	
Hobart Street	77 51	
Old Brighton High	15 00	
Oak Square	258 53	
Thomas Gardner	946 72	
Union Street	10 00	
Washington Allston	1,404 33	
Washington Allston Annex	214 29	
Carried forward	$9,274 16	$239,771 19

Brought forward	$9,274 16	$239,771 19
William Wirt Warren	594 81	
Winship	449 18	
		10,318 15
Portable buildings (92)		6,358 25
Incidentals, not chargeable to any one school		31,638 93
Administration expenses		19,643 72
School Committee building		1,764 16
Spectacle Island School		12 00

Hired Buildings, Rents and Repairs.

Beech-street lot	$125 00	
Bennington-street lot	240 00	
Brooks street, Faneuil	512 10	
Centre street, Dorchester, lot	200 00	
Chambers street, 27	1,260 02	
Chambers street, 38	1,287 82	
Chambers street, 103	725 62	
Chauncy Hall	4,935 28	
Columbus avenue, 147	140 50	
Columbus avenue, 1448	2,939 06	
Eliot street, Jamaica Plain	300 00	
Fourth street, 484, South Boston,	749 70	
Hewlett street, 17, Roslindale	271 27	
Jordan Hall	30 00	
Lauriat avenue, 170	1,213 70	
Minton Hall	10 00	
Parmenter street, 20	1,000 00	
Pearl street, 8, Charlestown	583 73	
Saratoga street, 399, East Boston,	325 90	
St. Stephen's Church, Moon street,	180 00	
Unitarian Church, Roslindale	648 50	
Warrenton street, 63 and 63A	1,703 12	
Washington street, 1008	1,412 28	
		20,793 60
Total		$330,300 00

IV.

STATEMENT OF INCOME.

Received from sale of old furniture	$65 00
Total	$65 00

APPENDIX III.

HIRED BUILDINGS.

I.

Rooms in the following buildings have been hired for school purposes; rents, taxes, water rates, heating, lighting and janitors' expenses paid for the same, amounting to $17,673.53, during the year from February 1, 1907, to February 1, 1908:

For	Location.	Remarks.
Bennett District, Kindergarten,	Brooks street, Faneuil Church	Rent per annum, $600, including heat and janitor. Vacated Nov. 1, 1907.
Blackinton District	Bennington street, for Portable Building, 51	Rent per annum, $240, for use of land only.
Comins District, Kindergarten and Primary Classes	Germania Hall, Columbus avenue, 1448	Rent per annum, $2,400, including heat and janitor.
Dorchester High School	Centre street, Dorchester, for Portable Buildings, 10, 31, and 32	Rent per annum, $200, for use of land only.
Emerson District, Primary Class	Saratoga street, 399	Rent per annum, $300, not including heat or janitor.
Franklin District, Primary Classes	Asylum Building, Washington street, 1008	Rent per annum, $600, to April 1, 1907; $1,200 thereafter. City to furnish fuel.
Girls' Latin School	Chauncy Hall, Copley square	Rent per annum, $8,000, from July 1, 1906, and taxes; city pays for heat, water and janitor. Vacated July 1, 1907.
Hancock District, Kindergarten and Primary Classes	Parmenter street, 20	Rent per annum, $1,000, including heat and janitor.
Longfellow District, Primary Classes	Beech street, Phineas Bates Portable Building, 12	Rent per annum, $125, for use of land only.
Longfellow District, Primary Class	Hewlett street, 17	Rent per annum, $240, not including heat or janitor.

HIRED BUILDINGS.— *Concluded.*

For	Location.	Remarks.
Longfellow District, Kindergarten Class	Unitarian Church, Roslindale	Rent per annum, $600, including heat and janitor.
Manual Training School	Eliot street, Jamaica Plain,	Rent per annum, $300, including heat and janitor.
Quincy District, Grammar Classes	Moon street, St. Stephen's Church	Rent per annum, $2,160, from Nov. 11, 1907, including heating and janitor. Vacated Dec. 11, 1907.
Roger Wolcott District, Kindergarten and Primary Class	Lauriat avenue, 170, Dorchester	Rent per annum, $1,200, including heat, water, and janitor.
Shurtleff District, Kindergarten and Cooking School	East Fourth street, 484, South Boston	Rent per annum, $600, not including heat, water, or janitor.
Warren District, Kindergarten and Primary Class	Pearl street, 8, Charlestown	Rent per annum, $720. City pays heat, water, and janitor's services. Vacated Oct. 1, 1907.
Washington District, Special and Ungraded Class	Chambers street, 103	Rent per annum, $1,620, from Oct. 10, 1907, including heat and janitor.
Wells District, Primary Classes,	Chambers street, 27	Rent per annum, $800. City pays one-half cost of gas and water rates, also pays for janitor and heating.
Wells District, Kindergarten and Grammar Classes	Chambers street, 38	Rent per annum, $1,080, including heat, janitor, and water rates.
Winthrop District, Grammar Classes	Warrenton street, 63-63A	Rent per annum, $1,200. City pays water rates, heating, and janitor.

II.

SUBDIVISION OF EXPENDITURES.

Amounts paid from appropriation for rents, taxes, water rates, heating, lighting and janitors' services, for each hired building during the year 1907–1908:

Beech street lot, Roslindale	$125 00
Bennington street lot, East Boston	240 00
*Brooks street, Brighton, Faneuil Chapel	500 00
Carried forward	$865 00

* Vacated during the year.

Brought forward	$865 00
Centre street lot, Dorchester	200 00
Chambers street, 27, West End . . .	834 78
Chambers street, 38, St. Andrew's Chapel .	1,080 00
Chambers street, 103	405 00
*Chauncy Hall, Copley square	4,659 75
East Fourth street, 484, South Boston . .	613 00
Eliot street, Jamaica Plain, Trustee Building .	300 00
Germania Hall, 1448 Columbus ave., Roxbury,	2,400 00
Hewlett street, 17, Roslindale . . .	240 00
†Jordan Hall	30 00
Lauriat Avenue, 170, Dorchester . . .	1,200 00
‡Minton Hall	10 00
Parmenter street, 20, North End Union . .	1,000 00
*Pearl street, 8, Charlestown	493 00
Saratoga street, 399, East Boston . . .	300 00
*St. Stephen's Church, Moon street, North End,	180 00
Unitarian Church, Roslindale	600 00
Warrenton street, 63 and 63A, City Proper .	1,213 00
Washington street, 1008, City Proper, in rear .	1,050 00
	$17,673 53

* Vacated during the year.

† Hired for graduation exercises of Mechanic Arts High School, on account of work being done at building.

‡ Hired for graduation exercises of Francis Parkman School, on account of work being done at building.

APPENDIX IV.

Table Showing Cost of Buildings, Cost per Cubic Foot, Children Accommodated, and Cost per Pupil.

Name of School Building.	Grade.	Building, Heating, Plumbing, and Electrical Contracts.	Total Cost of Building.	Percentage Contracts Bear to Total Cost of Building.				Cubical Contents.	Cost per Cubic Foot.	Proportion Contracts Bear to Cost per Cubic Foot.				Cubic Feet, Class-room.	Children Accommodated.	Cost per Pupil.
				Bldg.	Heat.	Plumb.	Elec.			Bldg.	Heat.	Plumb.	Elec.			
				Per Ct.	Per Ct.	Per Ct.	Per Ct.		Cents	Cents	Cents	Cents	Cents			
Marshall	P.	B., $106,516 75 H., 9,483 00 P., 5,197 00 E., 3,270 90	$124,467 65	85	8	4	3	516,624	24	20	2	1	1	37,000	700	$177 81
William E. Russell	G.	B., $158,189 52 H., 15,132 40 P., 9,580 29 E., 5,622 35	188,524 56	84	8	5	3	894,941	21	17	2	1	1	50,000	900	209 47
Farragut	P.	B., $127,262 98 H., 12,432 00 P., 6,821 45 E., 4,010 00	150,526 43	85	8	4	3	652,630	23	19	2	1	1	47,000	700	215 04
Paul Jones	P.	B., $95,095 75 H., 10,376 00 P., 5,324 00 E., 3,574 60	114,370 35	83	9	5	3	510,386	22	18	2	1	1	36,000	700	163 39
Ellis Mendell	P.	B., $103,569 20 H., 9,625 04 P., 5,658 11 E., 3,414 85	122,267 20	85	8	4	3	517,035	24	20	2	1	1	43,000	600	203 78
Jefferson	G.	B., $182,261 94 H., 16,927 15 P., 6,449 90 E., 5,251 50	210,890 49	86	8	3	3	856,777	24	20	2	1	1	45,000	950	221 99

THE FRONT OF THE FRANCIS PARKMAN SCHOOL.

Washington	G.	B.,	$263,661 16														
		H.,	28,305 94														
		P.,	21,417 05														
		E.,	12,157 45														
				325,541 60	82	7	7	4	1,300,792	25	20	2	2	1	43,000	1,500	217 03
Christopher Columbus	P.	B.,	$136,966 08														
		H.,	16,244 00														
		P.,	15,519 00														
		E.,	4,783 00														
				173,512 08	79	9	9	3	727,068	23	18	2	2	1	30,000	1,200	144 59
John Boyle O'Reilly	P.	B.,	$95,712 50														
		H.,	10,227 00														
		P.,	4,040 00														
		E.,	2,859 50														
				112,839 00	85	9	4	2	450,248	25	21	2	1	1	32,000	700	161 20
Oliver Hazard Perry	G.	B.,	$118,497 38														
		H.,	17,621 50														
		P.,	5,094 00														
		E.,	4,932 75														
				146,145 63	81	12	4	3	612,351	24	19	3	1	1	44,000	700	208 78
Mather	G.	B.,	$241,098 44														
		H.,	27,807 00														
		P.,	11,645 50														
		E.,	8,782 05														
				289,332 99	83	10	4	3	1,353,831	21	17	2	1	1	42,000	1,600	180 83
Add'n, Francis Parkman, Thomas Gardner[1]	G.	B.,	$113,769 15														
		H.,	15,994 04														
		P.,	6,038 00														
		E.,	4,466 38														
				140,267 57	81	12	4	3	735,573	19	15	2	1	1	52,000	700	200 38
Oliver Wendell Holmes	G.	B.,	$159,563 85														
		H.,	21,930 18														
		P.,	8,037 00														
		E.,	6,116 99														
				195,648 02	81	12	4	3	991,609	20	16	2	1	1	41,000	1,200	163 04
Samuel W. Mason	P.	B.,	$99,527 64														
		H.,	10,447 00														
		P.,	4,990 00														
		E.,	3,360 00														
				118,324 64	84	9	4	3	438,223	27	23	2	1	1	31,000	700	169 03

[1] Cost to February 1, 1908.

Table Showing Cost of Buildings, Cost per Cubic Foot, Children Accommodated and Cost per Pupil. — *Concluded.*

Name of School Building.	Grade.	Building, Heating, Plumbing, and Electrical Contracts.	Total Cost of Building.	Percentage Contracts Bear to Total Cost of Building.				Cubical Contents.	Cost per Cubic Foot.	Proportion Contracts Bear to Cost per Cubic Foot.				Cubic Feet, Class-room.	Children Accommodated.	Cost per Pupil.
				Bldg.	Heat.	Plumb.	Elec.			Bldg.	Heat.	Plumb.	Elec.			
				Per Ct.	Per Ct.	Per Ct.	Per Ct.		Cents	Cents	Cents	Cents	Cents			
Dearborn[1]	G.	B., $182,240 82 H., 20,874 00 P., 8,929 50 E., 5,087 00	$217,131 32	84	9	4	3	980,100	22	18	2	1	1	47,000	1,050	$206 66
John Greenleaf Whittier,	P.	B., $61,053 55 H., 7,540 70 P., 3,551 00 E., 2,590 90	74,736 15	82	10	5	3	325,051	23	19	2	1	1	32,000	500	149 47
James Otis	P.	B., $90,867 00 H., 8,767 00 P., 4,889 00 E., 3,295 00	107,818 00	84	8	4	4	411,645	26	22	2	1	1	34,000	600	179 70
Tuckerman	P.	B., $61,875 79 H., 8,422 00 P., 4,226 70 E., 2,898 76	77,423 25	80	11	5	4	330,171	23	18	3	1	1	33,000	500	154 85
Wm. E. Endicott	P.	B., $64,745 25 H., 7,951 00 P., 3,667 91 E., 2,693 61	79,057 77	82	11	4	3	348,883	23	18	3	1	1	35,000	500	158 11
Sarah J. Baker	P.	B., $130,016 23 H., 18,673 00 P., 7,625 00 E., 4,880 00	161,194 23	81	11	5	3	702,384	23	18	3	1	1	29,009	1,200	134 32

Nathaniel Hawthorne....	P.	B., $54,682 82 H., 7,518 00 P., 3,100 00 E., 2,611 25	67,912 07	80	11	5	4	281,305	24	19	3	1	1	31,000	450	150 92
Charlestown High[1].....	H.	B., $251,256 35 H., 18,677 00 P., 13,970 00 E., 9,744 00	296,465 79	85	7	5	3	1,170,000	25	21	2	1	1	.....	540	549 01
NORMAL AND LATIN GROUP.																
Common Building[1].....																
Normal[1].	H.	B., $279,978 40 H., 26,350 91 P., 13,175 45 E., 9,881 59	329,386 35	85	8	4	3	1,416,947	23	19	2	1	1	.....	350	941 10
Latin[1].....	H.	B., $257,030 19 H., 24,191 08 P., 12,095 54 E., 9,071 65	302,388 46	85	8	4	3	1,300,808	23	19	2	1	1	.....	600	503 98
Patrick A. Collins[1].....	G.	B., $144,923 59 H., 23,639 87 P., 6,819 93 E., 5,114 95	170,498 34	85	8	4	3	733,446	23	19	2	1	1	43,000	850	200 59

[1] Cost to February 1, 1908.

NOTE.—Number of new buildings, 27. Total amount of contracts, elementary grades (primary and grammar), $3,368,429.34; high, $928,240.60; addition, Francis Parkman School, $36,976.99; grand total, 4,333,646.93. Total number of children accommodated: Primary, 9,050; grammar, 9,450; total, 18,500. Average cost per cubic foot, all buildings, 23 cents. Average cost per cubic foot, primary, 24 cents. Average cost per cubic foot, grammar, 22 cents. Average cost per pupil, $181.72. Average cost per pupil, primary, $164.03. Average cost per pupil, grammar, $198.66.

These averages apply to the Charlestown High School, Normal School and Girls' Latin School only as to the cost per cubic foot. The Common Building is used jointly by the pupils of the Normal and Girls' Latin School, hence the cost of this building and cubical contents has been equally distributed between these two buildings. Patrick A. Collins School now used temporarily as quarters for High School of Commerce.

APPENDIX V.

ARCHITECTS' SERVICES.

Every Architect employed by the Schoolhouse Commissioners of the City of Boston as the Architect for erecting a building is to perform the duties hereinafter provided.

SECTION 1. — *The Board.* — (*a.*) Is to furnish the Architect with the requirements and information for the design and construction of the building for which he is the Architect, and give the approximate cubical contents and proposed cost per cubic foot thereof;

(*b.*) Is to employ domestic engineers to confer with the Architect during the preparation of preliminary studies, and when these are accepted by the Board to advise the Architect in the details of their work, and make the necessary working drawings and specifications for, and have the direction of, the heating, ventilating, and electric work for the building, said work being hereinafter designated as the domestic engineering;

(*c.*) Is to give the grade and lines of streets and adjoining lots;

(*d.*) Is to make all borings necessary to determine the quality of the foundations, and on request of the Architect, or of any person doing work on the building, furnish him full information relating to the above, the sewer, water, gas and electric service, and to the rights, restrictions, and boundaries of the lot on which the building is to be constructed.

SECT. 2. — *The Architect.* — (*a.*) Is to consult and advise with the Board and make such preliminary studies as will acquaint the Board with the contemplated arrangement, design, construction and cubical contents of the building, and enable them to agree with the Architect upon a definite limit of cost therefor, and to accept said preliminary studies as the basis of working drawings and specifications;

(*b.*) Is to make upon the basis of said preliminary studies one complete set of working drawings in ink on tracing cloth, floor and framing plans, sections and elevations at one-eighth scale, and such detail drawings on a larger scale as are necessary to explain the specifications;

(*c.*) Is to furnish, revise and correct for the printer one complete set of specifications for everything to be furnished or done in constructing the building, except the domestic engineering;

(*d.*) Is to loan to the Board, to make blue prints therefrom, the said set of working drawings;

(*e.*) Is to restudy and if necessary redraw, without charge, any or all of said drawings and specifications, if, owing to an unwarranted departure from the approved preliminary studies or to a needlessly extravagant or elaborate interpretation of them in said drawings and specifications, the lowest bid for doing the work in accordance therewith over-runs the limit of cost agreed upon by the Architect and the Board;

(*f.*) Is, upon the signing of contract, to deliver to the Board, to remain their property, two sets of blue prints mounted on cloth taken from the said set of working drawings, a perspective drawing of the exterior of the building suitable for reproduction, and at the conclusion of the work, a complete set of working drawings on tracing cloth, either the set previously referred to or a copy therefrom, which shall be corrected to agree with and embody all changes made during construction.

(*g.*) Is to make application for a building permit to the Building Department on a form signed by the Chairman of the Board, and deliver to the Building Department two sets of such blue prints from the said set of working drawings as may be required by the Building Department (the Board furnishing specifications to the Building Department);

(*h.*) Is to have general supervision of the domestic engineering and be the Architect of all other work to be done under any written contract for the construction of the building and render the full usual Architect's services, and supervision for such other work;

(*i.*) Is, in the form prescribed by the Board, to make all estimates and allowances for payments under any contract in which he is made the Architect of the work, and such estimates for the domestic engineering are to be accompanied by certificates of said Engineers as to their accuracy;

(*j.*) Is to advise with the Board on any changes in the building contemplated by the Board, and is to order changes when required by the Board so to do;

(*k.*) Is to cause the drawings and specifications furnished by him to conform to all regulations of law and public authorities, and to be in accordance with established methods of building construction, faithfully carry out all the foregoing provisions, use all proper knowledge, skill, and care therein, and be accountable for any failure so to do.

SECT. 3. — The city, as full compensation for the services aforesaid; is to pay the Architect 2½ per cent. upon the cost of the domestic engineering, and 5 per cent. upon the cost of all other work, payments to be made as follows: 2½ per cent. upon all contracts other than those for domestic engineering is to be paid on the signing of such contracts, and thereafter 2½ per cent. upon the value of the materials and labor, as specified in each estimate for payment under the contract, is to be paid on the making of the estimate, until the full payment aforesaid is made,

and if any thereof remains unpaid at the completion of the work it is then to be paid. When preliminary studies are completed, the value of the Architect's services to date shall be reckoned one-fifth of the estimated total commission; when working drawings and specifications are ready for contract, the value of his services to date shall be reckoned as three-fifths of said commission. If the Board discontinue the services of the Architect at any intermediate stage the value of his services shall be reckoned proportionately.

SECT. 4. — When for any reason other than those stated in section 2, paragraph *e*, above, the Board shall set aside the whole or any part of an Architect's studies, drawings, and specifications while retaining him to prepare corresponding new studies, drawings, and specifications, for the same school building, the city shall pay the Architect for the work thus set aside a sum not exceeding three times the actual cost of draughting, and the new work shall be paid for on a commission basis as stated in section 3, above.

SECT. 5. — In the above agreement the term "building" is used to define not only the structure itself, but all work in connection with it committed to the Architect by the order of the Board, as fencing, grading, roads, walks, planting, decorative painting, and sculptural decoration.

APPENDIX VI.

REPORT ON HEATING AND VENTILATING.

The Board has not obtained sufficient data during the past year to present a definite statement of the performance of the heating and ventilating apparatus in the new school buildings. Observations are being made whenever the occasion permits, and the results are preserved for future reference. During the coming year it will be possible to make a careful study of the whole subject, and it is hoped that information of value may be derived from these tests.

In a number of the schools where scales are provided daily records are being kept by the janitors of the amount of coal consumed, the number of barrels of ashes resulting, the weather conditions, the number of boilers in use, together with the length of time the apparatus is run. In addition, those who operate the apparatus are invited to make any suggestions as to the methods of operation or improvements in design. These records will be extremely useful to the Board in laying out future work.

The publication of data relating to the heating and ventilating of schoolhouses in any one city represents in a way the solution of local problems. To cover the field thoroughly, it is desirable that steps be taken to secure the attendance of engineers who are employed by the various cities throughout the country exclusively on schoolhouse problems, at a meeting held at least once a year. An organization of this sort, having a definite aim in view, could map out a systematic plan of study which, in a few years, would place the entire subject upon a firm foundation. Such topics as the cleaning and humidifying of the air, the most satisfactory methods of heating and ventilating the various rooms, the proper disposition of radiating surface to obtain the best results, the most economical form of building construction to receive the various parts of the apparatus, fuel consumption, and many others, afford a splendid opportunity for discussion. A detailed study of the cost of installation and the cost of operation, which are most important factors, could not fail to bring out much valuable information.

Not only would an annual meeting, as outlined above, be of great benefit to those in attendance, but, if the papers and discussions which were presented could be preserved in a per-

manent form and made available for general distribution, they would serve to call the attention of the public at large to the importance of satisfactory heating and ventilation and the most economical methods of obtaining it.

Respectfully submitted,

CHARLES F. EVELETH,
Department Heating and Ventilating Engineer.

APPENDIX VII.

PLANTING OF SHRUBBERY IN SCHOOLHOUSE YARDS.

In 1903, the department began planting shrubbery in the yards of the new buildings, and the practice has been extended until at the present time there is planting in thirty-one different yards belonging both to the old and new schools. Common hardy plants, that flower during term time, are used for miscellaneous work, with a thick hedge of privet or barberry on the street line, in place of the usual iron fence. California privet was first used, but, finding that it did not stand an unusually severe winter, the Japan privet has been substituted with very satisfactory results.

The Japanese barberry has not been used as freely as the privet for a hedge, because of the injury to the clothes of the pupils from too close contact with the long spines that cover the plant.

In the beginning the shrubs were usually bunched along the sides and at the intersection of paths, where the pupils had a tendency to cut corners and overrun the brick walks; as the children have become more interested, the plan has been gradually extended until in some instances the yards as well as the walks have been bordered with shrubs of considerable variety. The best example, which is also one of the latest, is the yard of the Sarah J. Baker School, with 681 plants of 49 varieties, not including a hedge of 451 privet, 223 feet in length.

The earlier plantings were not greatly encouraged by the masters and janitors of the schools affected; the masters possibly having in mind the additional opportunities for destructiveness that would be offered the pupils, and the janitors seeing an increase of work, required by the care of the shrubs, with no corresponding increase in salary; but in nearly every case the results have been satisfactory. The pupils have learned to appreciate the efforts put forth to beautify the grounds; the janitors have come to regard the shrubs as highly desirable, and in more than one instance the good appearance of the grounds is a matter of especial pride to every person in the school.

Of course there have been cases of partial failure, and at one school every shrub on the ground has disappeared, in spite of renewed plantings, but even the partial failures are small in proportion to the whole number of schools in which plantings have been made.

As in a majority of cases the grounds are not enclosed, it has often been found best to protect the shrubs, for one or two seasons, by a small wire fence, but even this slight protection is not always necessary. In more than one school where the shrubs have been so protected, the fence was required because of the lack of respect for property rights on the part of the general public rather than the carelessness of the children.

Space in eighteen school yards has been set aside for experimental gardens, in which the pupils are encouraged to plant seeds of their own choice. In this connection it is very interesting to know that to Boston is given the honor of establishing the first school garden in America. In 1891, Mr. Henry L. Clapp, master of the George Putnam School, set aside a portion of the yard for the cultivation of wild flowers; this practice continued until 1900, when a kitchen garden with eighty-four beds was laid out and given over to the care of the pupils of the sixth grade, thus giving each pupil who completed the full course in the school an opportunity to become familiar with garden work.

At the present time there are fifty beds, 8 feet by 10 feet, each in charge of a boy of the sixth grade. The girls have cooking that takes the time formerly given to gardening.

Because of the restricted space available for each pupil, no running plants are grown, but the common vegetables, like radishes, lettuce, beets, etc., with one or two hardy flowers, are usually grown in each bed.

With the exception of the garden at the English High School, the space used for such purposes in the other seventeen schools is much smaller than at the George Putnam, but the methods followed are essentially the same.

There is available at the Samuel W. Mason School about 30,000 square feet of land that could be used for an experimental garden if desired. When the building was erected this portion of the yard was laid down to grass, with a considerable planting of shrubs at one side and a hedge on the street line. Neither the people living in the vicinity nor the pupils of the school have seemed to appreciate the efforts to beautify the yard, for in spite of replaced shrubs, a wire fence outside of the hedges and signs requesting the public not to injure the planting, the former have used the grounds as a short cut between two streets, and the boys have played ball all over the lot until the grass and shrubs alike have entirely disappeared. A garden might succeed where ornamental planting has failed.

HENRY H. AUSTIN,
Civil Engineer.

THE EXPERIMENTAL GARDENS OF THE GEORGE PUTNAM SCHOOL.
The First School Garden.

SAMUEL W. MASON SCHOOL.
(Planted grounds not wholly successful.)

APPENDIX VIII.

REPORT ON ARTIFICIAL LIGHTING.

During the past year the Board has continued its investigation of the subject of improved artificial illumination in class-rooms, and after an exhaustive series of experiments has adopted a system which it believes will prove suitable to its requirements.

While the experiments made have been largely along the lines of the work done last year with the prismatic shades, mention of which was made in the last annual report, other methods have also been tested to determine their practical value.

An unused class-room at the old Dearborn School was darkened by boarding up the windows to exclude daylight, and fitted with suitable devices for convenience in hanging and connecting the various fixtures under observation. The supports for hanging the fixtures were arranged on sliding bars arranged for both lateral and longitudinal adjustments, and the wiring was so arranged that any fixture or group of fixtures could be lighted at will.

Suitable instruments for obtaining the necessary electrical data were installed, and also such apparatus as was available at the time for obtaining the value of the illumination. At the time these experiments were made reliable apparatus for the measurement of illumination was very difficult to obtain, and the results of all the experiments could not be determined with desired accuracy; nevertheless the apparatus employed was sufficiently accurate for purposes of comparison, and subsequent tests made with improved apparatus demonstrated that the original readings were approximately correct.

In general the experiments made may be classified as: 1. Indirect lighting, depending wholly or very largely on reflected light. 2. Direct lighting with lamps exposed to view; and, 3. Diffused direct lighting, which may be described as light sources so located and screened by diffusing substances that the direct rays of the illuminant, while directed toward the plane of illumination, do not readily reach the eye of the observer.

The indirect method was found to be the least efficient of all methods, and too greatly dependent upon the color and condition of the reflecting medium, such as the side walls and ceilings, and upon the cleanliness of the fixture itself.

The experiments with direct lighting were confined to attempts to light the room from the window side of the room, in order to obtain the effect of daylight. It was found to be impossible to place the lights where they would be effective without exposing the lamps to view, and too costly to operate by reason of the large numbers of lamps required.

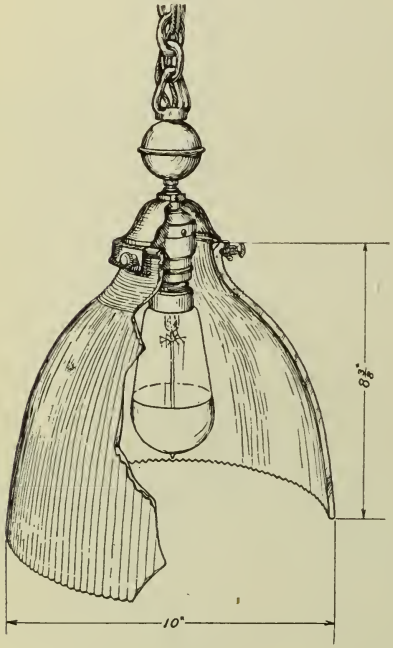


FIG. 1.

For the direct diffused method several types of fixtures and shades were tested, the most satisfactory results being obtained with a deep bowl shade of prismatic glass coated with a hard white enamel (Fig. 1) in conjunction with a Tungsten or other high efficiency lamp of approximately 40 candle power. The depth of this shade is such that only a small part of the lamp is visible from any point on the plane of illumination, and then only when observed at an angle considerably greater than the normal angle of vision. The tip of the lamp being of frosted glass, no part of the lamp filament is exposed to view, and the net result is an evenly lighted area, absolutely without points of excessive brilliancy and with a minimum amount of shadow. The foot candle illumination obtained from these shades is considerably lower than that obtained from similar shades without enamel, but it was found inadvisable to use the plain prismatic shades on account of their high intrinsic brilliancy.

Considerable difference of opinion exists concerning the importance of shadows, but the Board, after a careful study of the subject, is of the opinion that the moderate amount of shadow cast by properly located fixtures with shades of this type is for general purposes a distinct advantage, provided such shadow is made to fall to the right on the plane of illumination. This has been effected by arranging the fixtures as shown in Fig. 2, by which it will be seen that the centre of light distribution is slightly to the left of the longitudinal centre of the room and in front of the transverse centre. By this means the illuminating sources treated individually are so placed that there is always a unit slightly ahead, and

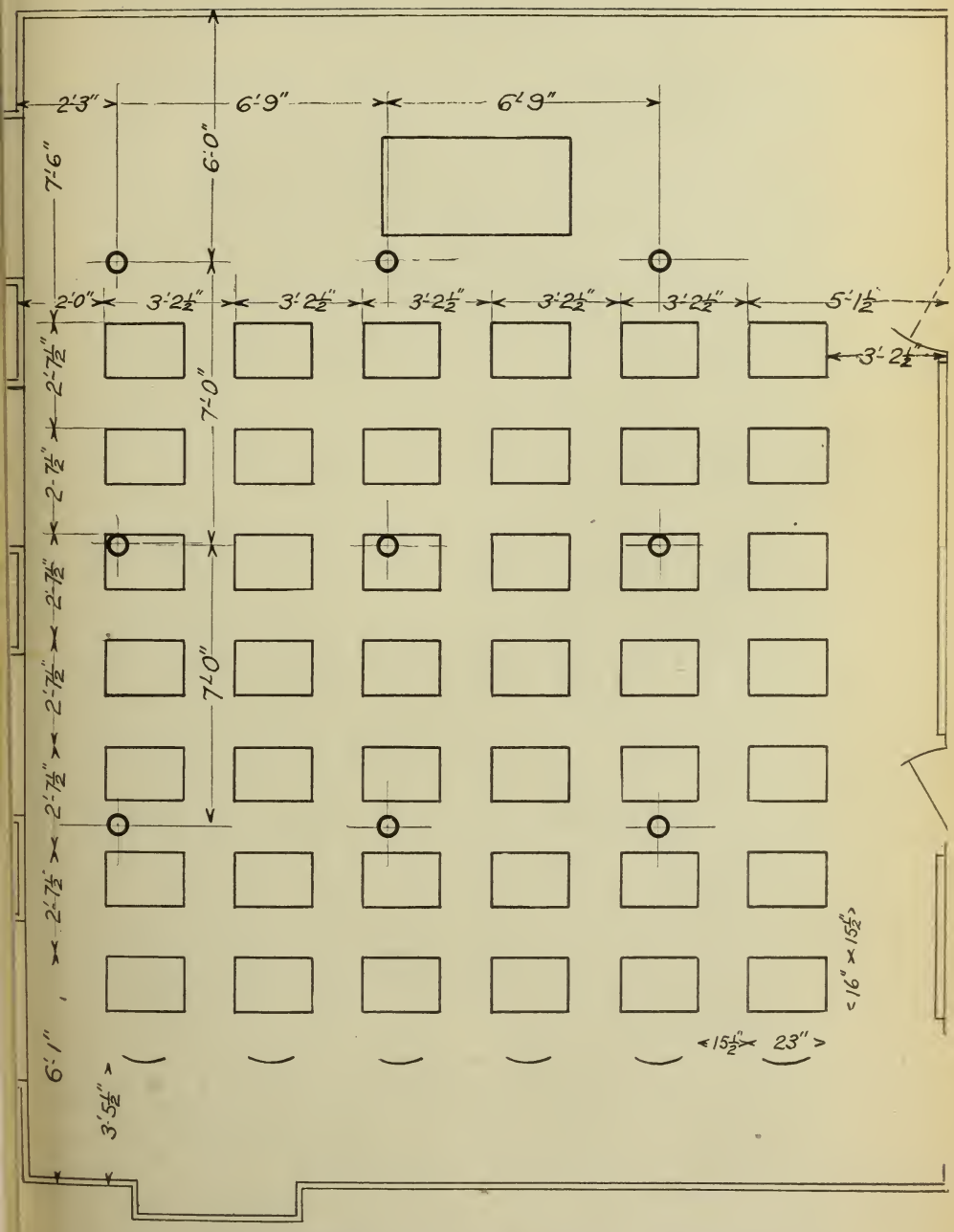


FIG. 2. — PLAN OF STANDARD SCHOOL-ROOM, SHOWING LOCATION OF LIGHTS.

NOTE. — This is the old standard size. In the new rooms, 23 x 29, seven outlets may be found sufficient.

to the left of each pupil, while treated as a whole the effect is similar to daylight from the left-hand windows.

It may appear that some desks will receive light from other sources than the desired one, but experience has demonstrated that this is seldom the case, the dominant shadow nearly always falling to the right, the minor shadows not being of sufficient intensity to be annoying.

The light from these shades, using either Tungsten or metalized filament lamps, has been found to be of satisfactory color, not rich in injurious rays of the spectrum, and not fatiguing to the eye. The light from the Tungsten lamp is somewhat whiter than from the ordinary carbon filament lamps, and seems to blend with natural light much better than any electrical illuminant other than the mercury-vapor lamp. As artificial light in school-rooms is usually required during the late afternoon in winter or on cloudy days, this is a very desirable feature.

Two buildings, the Wells and the Comins, both used for day and evening school, were completely equipped with this system at the beginning of the fall term, and have since given complete satisfaction to all concerned.

While the Board believes that this arrangement affords a satisfactory solution of the problem of artificial lighting in ordinary class-rooms, it does not consider it necessarily final in all cases, as, for instance, the lighting of drawing-rooms, laboratories, manual training rooms, etc., and it is probable that no very definite rule can be laid down for the lighting of such rooms, unless it be the rule of precaution against illuminants of intense brilliancy, and due care in the selection of illuminants free from injurious rays of the spectrum.

It is also doubtful whether a fixed rule can be established relative to the amount of illumination advisable for the health and comfort of the child, although a recent report submitted to the School Committee by the special committee of oculists and electricians on the artificial lighting and color schemes of school buildings recommends "that a standard of illumination be adopted in the Boston Public Schools, to wit, that the minimum illumination at each desk be two foot-candles."*

While the Board believes this to be approximately correct, it also believes that it may be necessary to make some modifications to suit local conditions, such as: 1, The method of application; 2, the color of the light; 3, the purpose for which the light is used, and 4, the color treatment of the surroundings. This is particularly true in the case of the method of application and the color treatment of the surroundings.

here the indirect method has been used, it has at a much higher actual illumination was necessary to give atisfaction than in the same or exactly similar

* By foot-c... is meant an amount of light equal to that given by a standard candle at a distance of one foot. Two foot-candles is therefore the same as the light from two candles at a distance of one foot.

rooms in which the direct or diffused rays of the illuminant were allowed to fall directly upon the plane of illumination. Some very interesting data on this subject are taken from the "Illuminating Engineer" of October, 1907, in which it is shown that the average excess of illumination required by ten observers was 65 per cent.

The color treatment of the walls and ceilings has a double bearing on the illumination, one being the value of the color as a reflecting medium, and the other being the psychological effect of color on the individual, this effect being greater or less, according to the illumination.

It is obvious that plain white walls and ceilings of proper finish would be ideal reflecting mediums, but such walls would under some conditions be undersirable, or even positively injurious, by reason of the violent contrasts with the blackboards and other dark objects below.

It has therefore been found advisable to adopt color schemes somewhat according to the situation of the room, as facing north or south, with or without sunlight, etc., but always with a view to the highest possible co-efficient or reflection to assist in both natural and artificial illumination. For rooms of a bright sunny aspect it has been found best to have the side walls of a warm gray green, while for the less sunny rooms a warm buff tone is satisfactory.

The co-efficient of reflection on these tones varies from 40 per cent. to 45 per cent. in the light greens to 55 per cent. to 60 per cent. in the buff as compared with pure white. The use of blue, red or black pigments in the colors should be avoided as much as possible, as any excess of either will greatly reduce the reflecting power, although not perceptible to the eye.

The ceilings have in most cases been left in untinted plaster, but our recent experiments indicate that a tint containing a moderate amount of chrome yellow will be more satisfactory than the blueish tone of the plaster.

In the matter of window shades, it has been found that from ten to fifteen per cent. better illumination can be obtained at the desks on the window side of the room when properly tinted shades are drawn over the windows than when the windows are exposed.

From the standpoint of efficiency the new system makes an especially good showing. In cost of operation the net saving amounts to about 50 per cent. when the Tungsten lamp is used. These lamps being of recent introduction, and largely of foreign manufacture, are still somewhat expensive, but are of such high efficiency that the net saving of 50 per cent. can be realized as above stated. American factories are now beginning to produce these lamps, and the effect is already noticeable in the prices, the lamp being now quoted from 20 to 25 per cent. cheaper than a year ago, with a prospect of still further reduction.

B. B. HATCH,
Electrical Engineer.

APPENDIX IX.

REPORT ON FIRE ALARM AND FIRE DRILL SIGNALS.

During the past year the Board through its electrical department has made a careful study of the subject of uniform fire-alarm equipment for the schools.

While it was found that a uniform fire signal, viz., four blows twice repeated, was the regulation signal prescribed by the School Committee, and that a greater part of the schools were possessed of apparatus of some sort for sounding this signal, there was great dissimilarity in the apparatus and in the individual ideas of those whose business it was to make use of it. In some buildings, particularly the older ones, it was found necessary, in case of a basement fire, to go up one or more flights of stairs to obtain access to the levers or keys controlling the various bells. In other buildings the controlling station was in a class-room, and in several cases the fire signal was sounded by means of a large dinner bell. In the newer buildings the programme bells in the rooms and corridors were controlled by buttons located in the master's office, and were used for fire signalling as well. The local telephone system is also available for the same purpose. In some cases the signals were under lock and key, and in others no one other than the master was authorized to give a signal.

One hundred and seventeen buildings were found to have an auxiliary connection to the city fire alarm system, for use in case of a genuine fire, but not usable for fire drill purposes. It is obvious that the principal purpose of a fire signal system in a school building is to facilitate the prompt execution of the fire drill. In case of fire it should not be necessary for the person discovering the fire to go up one or more flights of stairs to reach the signal or to search for the master or other individual who alone may have the authority to act. Neither should it be considered sufficient to call the fire department and leave all to them.

Any signal given should be distinctive from the regular programme signals, should be audible to everyone in the building, and should be so arranged that it can be used by the fire chiefs and other persons having authority to give an unexpected signal for the purpose of testing the school fire drill.

After a careful investigation, the Board being convinced that the usefulness of the auxiliary system was problematical

and unduly expensive, ordered its discontinuance and the installation of a system of local alarm boxes and bells fulfilling the requirements previously set forth.

Arrangements to this effect had been made, and one system was under construction when the disaster at Collinwood, Ohio, took place. Following this, at the request of His Honor Mayor Hibbard, the Boston Finance Commission made a very careful inquiry into the whole matter of fire signals in schools, and while their report agrees in its principal recommendations with the Board's original plans, it adds the recommendation that the auxiliary system be combined and operated with the local system, to which recommendation the Board has agreed and is now making the necessary changes in its apparatus.

The system as now arranged provides for one or more signalling stations and a powerful electro-mechanical gong on each floor of the building. Also a signal station and bell in the basement for the janitor.

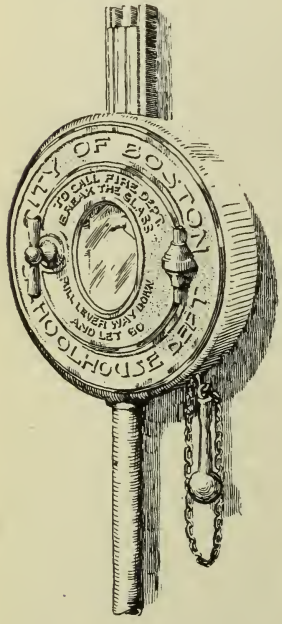


FIG. 1.

Each signal station consists of an iron box with hinged door, which is keyless, so that it may be opened at will. This door gives access to a lever, one movement of which causes all the gongs in the building to strike the regulation fire signal, namely 44. The signal is repeated three times. This is designated as the local signal, and gives no alarm outside the building. Attached to and forming a part of the keyless door is a separate compartment in which is mounted a lever, identical in appearance with the lever in the local signal box. This compartment is covered on the front by a sheet of glass. The lever is so arranged that one movement will set in motion the city fire alarm box, which may be located anywhere in or about the building, and also operates the local signal box and gongs, thus notifying both school and fire department simultaneously. This lever is of course for use only in case of a genuine fire, and can only be reached by breaking the glass, suitable devices for this purpose being conveniently located.

The system is thoroughly safeguarded against disarrangement, either electrical or mechanical, all the wiring and every device used being operated on a closed circuit so that a broken or crossed wire, an exhausted battery or other failure, is immediately made known by the ringing of a disarrangement

bell in the janitor's room. Provision is also made against the possibility of the wiring being burned away by fire, the wires being run through basements and all places exposed to fire in iron conduits.

In many cases it has been found that the city box, together with its auxiliary attachments, has been located in the basement or places obviously inaccessible in case of fire. These boxes the Board proposes to relocate on the outside of the buildings, and the boxes will be provided with keyless doors.

About seventy buildings are at present without connection to the Fire Department, and these the Board proposes to equip with boxes in the near future.

The interior system is also to be applied to all schools of six rooms and over.

B. B. HATCH,
Electrical Engineer.

APPENDIX X.

SCHOOLHOUSE CONSTRUCTION AS AFFECTING THE HEALTH AND SAFETY OF CHILDREN.*

The subject assigned to me would appear to be a somewhat narrow one. School-houses are of a simple and somewhat definite type, certainly those for elementary work, and it would seem that in building a series of class-rooms all alike and providing accommodation for toilets and for clothing there would be but a few simple rules that would affect matters of hygiene.

I propose, however, to look at health in a somewhat broader way and to accept as fundamental what was pointed out by Mr. Colcutt last year, that happiness is a large part of health and that what is represented by that much abused word æsthetics is closely related to hygiene; for the mental attitude of the child affects his health, and an honest and healthy appreciation of whatsoever things are lovely is a distinct physical gain for him.

Merely for the sake of coherence I will take up the school buildings from the outside — following the course of the pupil — the approaches, the entrances, the playrooms and toilets, the stairs and corridors, the class-rooms, recess and its occupations, and hours out of school; and, if some of this seems to you to be irrelevant, I can only say that all these points and the study of them have been forced upon me during the years I have been in charge of a department having nothing to do with the schools except attending to problems of building equipment and repair.

1. — The Grounds and the Building.

It is not only consideration of light and air that makes it necessary to have ample space about the school building. The children gather before school, and order and discipline alike require that there should be space for the marshalling of the children. If one could afford it, but unfortunately in the city one generally cannot, the marshalling places, called by most of us playgrounds, ought really to be large enough for play, but, as this is not practicable, sufficient space is reserved for the orderly arrangement of classes, and this space and the approaches to it are paved with brick, or granolithic, or asphalt — some material that can readily be kept clean. All the rest of the space is reserved for the proper setting of the building — well arranged and well planted areas with a

* Paper read before the Congress of the American School Hygiene Association at Atlantic City, April 17 and 18, 1908.

A CORNER OF THE GROUNDS OF THE OLIVER WENDELL HOLMES SCHOOL.

PLAYGROUND OF THE JAMES OTIS SCHOOL.
(Attempt to protect a hedge.)

certain amount of formality as is necessary in limited spaces in close proximity to the stiff and formal lines of architecture. The effect on the child of grounds well cared for is to teach him respect for order and for the city's property. The child as a rule is quick to respond to the influence of orderly beauty. . . A portion of this space may well be reserved for experimental gardening, which is being gradually adopted as a regular part of the child's education. . . If beauty in the grounds is important, so also is beauty in the building — nor are either of these inconsistent with strictest economy. The custom of Boston and of many other cities is to name their buildings after men with whose lives the children should be familiar, and in many cases the incidents of that life may suggest some decorative feature. Even if ornament of special significance is not possible, I believe that the influence of things that are good mould insensibly the thoughts of the child. If the child enters school from pleasant surroundings, if these are sometimes in marked contrast to squalor and disorder at home, and if, in entering, he is taught order and discipline and a love of beauty, a first and an important step is taken toward a mental attitude that will help him to forget physical defects or impediments.

2. — Entrances, Stairs and Corridors.

To avoid as far as possible taking mud and dust up into the class-rooms the children enter the basement, and that these rooms may be light and dry they are raised above grade sufficiently to give good windows, and also to give head-room for outside doors, with the steps down on the inside. This avoids area steps and the difficulties of caring for water, snow and ice which accumulate in such places. Ideally I should like to see the outer clothing and overshoes, which may be wet or muddy, left here, but in elementary schools masters generally prefer having wardrobes adjoining the class-rooms. The basement wardrobe is used in the more recent Boston high schools. The toilets for boys and girls are in the basement. Boston has adopted after various trials a special heavy closet of short-hopper type, with large local ventilation, and a continuous slate urinal also vented. All the ventilation of the toilet rooms goes out through these fixtures. They are simple, strong, easily cleaned and easily renewed in case of breakage. The floors are pitched and drained so that they can be kept washed down. There is no reason why such toilets should not always be perfectly sweet and clean. The best equipment, however, is dependent to a large extent on those who handle it.

If the entrances to the basement are kept independent of the main staircases, the children coming in will not interfere with those going up. The children, especially the younger ones, should be reminded at least to go to the toilet room before going up stairs, so that the natural sequence is entrance to the playrooms, exit through or by the toilet rooms, with doors in and out, and so to the stairs. The stairs for safety and cleanliness should be

of a material that will not readily wear dusty or slippery. After trying granolithic, asphalt, slate and N. R. stone, the latter has seemed to give the best results. It is fairly smooth, but never slippery, and is inexpensive. The rail, if of iron, should be very simple to insure its being kept clean.

I find a difference of opinion among masters on the method of filing on the stairs. Some order the children to keep to the sides near the wall or the rails, others want the children to file in the centre and not touch the rail or wall; on the method depends the use of a wall rail and the detail and height of both rails, as it is evident that a hand rail of proper height for protection is too high for little tots to put their hands on. My own observation is that little children rarely depend on a rail, and that filing in the centre keeps dirty clothing (which the bulk of our tenement children wear) away from the walls. A stairway entirely of concrete with granolithic surface and solid rail makes a very hygienic staircase, but the solid rail sometimes interferes with the light and makes supervision more difficult. What applies to the stairs about filing applies also to the corridors. The walls in both cases should be of a material that will stand wear and tear and washing. Boston has copied Chicago, and uses burlap painted and finished with a smooth glazed surface. Terazzo floors are smooth and inexpensive, they are divided into squares to prevent setting cracks and have marble bases. With buildings on lots large enough to insure good light on all sides, the corridors ought to have plenty of good outside light and not depend on light borrowed from class-rooms. The best way to insure cleanliness is to have ample light.

3. — Class-Rooms and Wardrobes.

The children are now brought to the class-room door; the elementary children with us have their outside clothing still on, and it may be wet and dirty. Immediately adjoining the class-room door, but opening from the class-room — the wardrobe door to the corridor makes petty pilfering or mischief possible — is the nearer of the two wardrobe doors, and into this the children file without crossing any but a small corner of the class-room. The clothing is hung on pins on poles away from the wall, a steam pipe protected by netting runs behind the clothing, and a zinc-lined tray takes drip from umbrellas, wet shoes and clothing. In winter when heat is on this arrangement is admirable. The wardrobe draws air through one door from the class-room and vents at the other end to a separate duct. The floor here is wood. I think it might well be terazzo like the corridors and slightly pitched to drain; this would avoid the necessity for the zinc-lined trough.

The class-room is the most important room in the building. On the question of aspect there are as many expert opinions as there are points of the compass. North light is advocated because it avoids the sharp changes of light incident to sunlight. South is advocated because the sun comes direct. East and west are

SARAH J. BAKER SCHOOL.
(A hedge fairly established.)

advocated because they supply health-giving sunlight some time during the day, and the absence of glare at other times. The architect facing the practical problem of a large number of rooms on one floor knows that he will be forced to have rooms on at least three out of his four sides, and, personally, I believe that the worst class-room is one that is due north and has no sunlight, or at least none in winter, and that east and west are better than due south, because the latter will have continuous sun through school hours. Again, on the question of unilateral lighting, there is a decided difference in practice if not of belief. It seems to me that if ample light for the whole room can be admitted from one side this is better than having windows which will be in face of the scholars or even of the teacher. The latter is less objectionable, as she may move the position of her desk or of her chair, and I would rather have these windows on the west end of a north room, for the sake of afternoon sunlight, than cut all sunlight out of the room. One cannot lay down absolute rules — although we do — as to the amount necessary. We say one-fifth of the floor area. But it is obvious that if this is necessary where light from the sky is unobstructed that more is necessary on a narrow street where high buildings cut the sky line. The area depends, also, on how it is measured; the highest part of the window is of most use for the desks farthest from the light, and glass below say 3 feet from the floor is not of much use anywhere. For the guidance of our architects we say that the glass is to be measured from 2.6 above floor to within 6 of the ceiling, and is measured inside the sashes, but disregarding muntins. In all except the worst city conditions this will give light enough on an ordinary day. No amount of glass will light a room on a very dark winter's day, and less than this amount may serve where the building is quite in the open. When the day is dark artificial light must be used; I was about to say added, but when there is insufficient daylight I believe that it would be better to draw the shades and depend wholly on artificial light. This is not the usual custom, but it seems to me that such unmixed light is less trying to the eyes. Few things are more important hygienically than conditions which do not put an undue strain on the eyes, and with the steady increase in demand for evening schools the proper artificial light becomes more and more important. Boston experiments have been conducted along two lines — first, an attempt to eliminate shadows; second, an attempt so to control their direction as to approximate the daytime conditions of left-hand lighting. The former resulted in a fixture which illuminated the ceiling and so diffused the light as to eliminate shadow, but as experiment showed the complete elimination of shadow to be a disadvantage a porcelain undershade was adopted to allow some of the light to fall direct. The only real trouble with this experiment was that one could not readily see the lamps and know whether they had lost their efficiency, nor could the janitor easily clean the clear glass coverplate, on which the amount of light on the ceiling depended.

The second experiment was more successful and resulted in a fixture which gave direct light, but from so high up and so diffused with ground glass bulbs and distributed with reflectors as not to be disturbing to the seated pupil. The fixtures are placed towards the front and the window side of the room, so that the preponderance of shadow is as in the daytime. This, I believe, will work out well for ordinary class-rooms with fixed seats, but in other rooms, laboratories, etc., where pupils face various ways, a modification of the first system will probably prove better. In the Mechanics and Traders School in New York the classes are seated at tables formed in a hollow square, and here the reflected light has been most successful. I propose to try the modified reflected light in the class-rooms of the Franklin Union, where the pupils will be seated in the same way. I have gone somewhat at length into this subject of light, as it seems to me one of the most important ones, and one on which the last word has not been said. Certainly, as a result of experiments in both day and artificial lighting, I should not be willing to lay down very definite rules for either. Before leaving this, one word about window shades. In our modern Boston buildings nearly all rooms have sun at times, and the shades often have to be entirely drawn. They cannot be dark, or even tolerably opaque, without darkening the room unduly, and if they are very light, or even transparent, like Holland, the sun shining on them will be almost as glary as if they were not drawn. The best results have been obtained from a light colored painted shade — gray, buff or very light olive green. The light colored shade is also a factor, and an important one, in artificial lighting, as it makes practically one wall surface when drawn. . . .

If opinions differ as to aspect — and artificial light — on the vexed questions of color the situation is even worse. No two people agree about color — no two people even see it alike — and when to this is added the problem of color which will be used both under daylight and under artificial light, it is readily seen that the subject is complicated. But this is not the end of the complication by any means; for now we must consider the beauty of the rooms — we must try for a scheme of color that is more than merely quiet and unobjectionable — that has some positive merit. I will not, therefore, throw down the glove on this subject, but merely describe what general lines we work on in the Boston schools. The floors are wood, and as they are oiled they will soon be a dark tone; the blackboards of slate are dark; the woodwork, which is reduced to a minimum, base, rail, frame of blackboards, doors, bookcases, etc., is kept to tone with this floor, and as the walls up to 7.0 are already largely occupied with the dark tone of blackboards, the burlap colored walls up to 7.0 high are kept in a comparatively dark tone — for example a brownish stain on ash for the wood, and a quiet green or warm light brown for the burlap. About this same tone is used for the desks, although recently a distinguished group of experts employed by the School Committee have reported in favor of the

lightest possible wood (say natural birch or maple) for desks. This would suggest quite another color scheme in which the only dark note would be the black slate. This whole question of color is a vexed one. One consideration is the amount of light; nothing except white walls will give the fullest efficiency to the daylight admitted. It is quite possible that under unfavorable conditions the lightest walls giving the greatest reflections would be desirable; but under good conditions this might vary from unnecessary through undesirable to positively harmful. Another phase of this reflecting quality is brought in if the rooms are used in evening when the reflections from walls, unnecesary in daylight, may be highly desirable to increase the efficiency of artificial light. A second consideration is the beauty of the room as a whole — that is, a due consideration given to the harmony of color used in the room. This, although not as important as having sufficient light, is none the less a matter not to be disregarded for the influence it has on the child. Again, it is that faintly defined relation between health and happiness — the mental attitude of the child as it affects his health, with which one is concerned in trying to give him pleasant surroundings. A long series of experiments in color, in which I have been greatly helped by the Public School Art League, has resulted in the general adoption of a light warm brown for woodwork and tones of brown, green or buff, of some depth, harmonizing with this up to the 7-foot line, and above this very light walls, in warm gray green for sunny aspects and a warm buff for the less sunny rooms. It is essential that there should be no sharp contrasts between the upper and lower halves of the walls, as nothing is more trying to the eyes than this. In one school, where experimentally we had tried rather deep reddish browns on the lower half and strong cream above, the contrast was so extremely trying, especially when the sun was shining in, that we had to have all the rooms repainted. The ceilings we have left bare plaster untinted; but I am inclined to think from recent experiments that a cream tint would be better for reflecting than the bluish tone of plaster both for daylight and artificial light.

I have given considerable space to this matter of color, because I feel that no rules can be laid down, and one must be guided in exact tones by the position of each room; but the points to be borne in mind in all cases are — first, to use tones that will ensure the desired efficiency of reflection; second, to use tones that will give a pleasant harmony of color. When such results are reached the room may well receive further decorations in the way of pictures or casts. These have their subtle influence and ought therefore to be selected with the utmost care. In Boston, the Public School Art League have done most useful work in giving to the schools well chosen material, and a suggestion of theirs that each room should have its own individuality — say the landscape of the Barbizon school, American naval pictures, the development of the West — seems to promise excellent results in teaching something more concrete than a vague appreciation of

what is good. All this, I dare say, seems a far cry from hygiene — not so very, really.

Taking light as the first consideration in the class-room fresh air comes next. We use sometimes a plenum and sometimes a gravity system, generally the former, because it is surer and depends less on the human element. But all systems really depend on intelligent use, and although we are now in the midst of tests, and I cannot speak with complete statistics to prove anything, I feel reasonably sure that no system of air brought in and warmed and distributed can ever take the place of a thorough flush from open windows that will start school with good outside air even if it is a bit cold. Automatic control may work perfectly — it doesn't always — but the thermometer is not a final gauge of what is comfortable, for the amount of moisture in the air has more effect on our comfort than is generally understood. I have tried some experiments looking towards moistening the air in winter, but have not yet arrived at anything wholly satisfactory. All these equipments cost money and require care and intelligence to run, which again cost money, and the fresh air from outside is really fresh and also carries much more moisture than when it has been heated.

One real problem, that even open windows will but partially remedy, is the foulness of the clothing, and probably also of the bodies, of the tenement district children. A suggestion has been made that they should be washed and given a school suit — at the same time they should be disinfected and have vermin removed — and then if they appear ill-nourished should be fed. This is all right, of course, and in a way seems but fair to the clean children who must pass hours every day in close contact with the others. Again it is a question of money; are the people ready to pay for such paternal care? If not, are they ready to exclude from school privileges those who are not clean and neat — he is not necessarily a naughty boy; perhaps "his dear papa is poor." Perhaps a school for the unwashed would arouse the better feelings of parents, and they would make a real effort to have their children advanced from this unsavory distinction. Of one thing I am quite sure, that the children of our foreign population, especially the girls, are very quick to learn neatness and cleanliness, and the same children who went through the three lower grades foul and unwashed, may be seen neat and clean long before they have reached the immaculate white of their graduation dress.

There may be some excuse for the uncleanliness of the children; there is none for the uncleanliness of the rooms. I wish some floor material could be devised to which the desks could be fastened, but which could be washed clean every day. In the Franklin Union, where pupils are to have chairs at tables, the floors are linoleum, glued down permanently on the cement surface of the concrete construction. This makes an almost ideal floor, quiet, non-porous, and almost indestructible. At present we use wood, and urge the authorities not to wash it — which

destroys its life and does not clean it — but instead to clean it dry and rub it with linseed oil to give it a permanent surface. This requires constant care, such as one does not generally get from a janitor.

The vacuum system of cleaning has been tried, but without success, owing to the difficulty of handling the hose in and out among the fixed desks. From the point of view of cleanliness something better than the wood floor must be found. Slate blackboards, at present apparently the only durable and practicable material, are hygienically objectionable on account of the chalk and dust, æsthetically on account of their cold gray color, which interferes with any good color schemes. I am hoping that some substitute of a light tone on which the writing can be done in black will be found to take the place of this.

Before leaving the subject of the class-room I am glad to note that Boston has now reduced its standard class-room to a size that seats forty-four instead of fifty-six. This means better attention given to every pupil and incidentally gives my Board the problem of providing this improved kind of accommodation without increased cost.

4. — RECESS AND PLAYROOMS — PLAYGROUND.

England, a country with an inborn taste for out of doors, for sports, and for athletics generally, has always looked on play as a part of the school curriculum. The educated classes had it as a matter of course — and now that all classes are beginning to share alike the benefits of education, England at once moves toward giving all classes this necessary part of education. The English vacation schools and play centres supplement the games and sports that form part of the regular curriculum of all the schools. We are somewhat behind in this. It is true that that most uninteresting of all sports — called calisthenics, the mere name is enough to give any healthy child a prejudice against it — is generally practiced; but it is the real sports, now fortunately coming steadily into favor, that should be encouraged and conducted in a regular and orderly way as part of school work. We are apt to run to extremes in all we do. Our football and baseball teams must be put on a professional basis — our amateur plays are given on a fully equipped stage under professional guidance. I think we must look to the school authorities to take all this under their charge. The masters and teachers should be the only professional talent, and good basketball work, equally with a good memory for dates, ought to count for something in the pupil's standing. Even in the limited area of a modern city school much might be done both in the gymnasiums and in the yards to encourage systematic exercises and sports. The Boston School Committee have now taken charge of the city playgrounds, and organized sports will be carried on there. If we are to make good citizens of our foreign population, who crowd certain parts of all our large cities, we must give them a chance to develop healthy

bodies, and an especial outlay for gymnasiums and baths seems wholly justified in such places. It would be better still if an admirable suggestion made by Mr. J. R. Coolidge, Jr., could be carried out, to build, for the especial benefit of the tenement districts, country schools — sufficiently out of town to make it possible to have large tracts of land, and then establish all day schools for the upper elementary grades — say from ten or eleven years to fourteen or fifteen — giving these children throughout the school year the light and air of the country and a chance to play and exercise out of doors. Transportation and food are the real problems, and it would appear that the cost of these would be offset by the saving on land and buildings. Under circumstances so ideal as to space there would be no need of having any rooms in the basement, and the first floor could then be practically at grade, with playrooms and toilets on this ground floor. The buildings could easily be limited to two stories, so that a single flight of stairs would reach any room. Low buildings and comparatively narrow spans for small classes would mean light walls and floor frame, and the unrestricted light of the country would make a lower stud possible, so that in every direction there would be economy as an immediate result of the more healthful conditions. Those who are familiar with the school conditions in the crowded districts of our large cities will know what this would mean for the children. This, however, is something for the future. To-day the practical question is how to make the conditions that exist the best possible for the children. In the buildings themselves light, fresh air and cleanliness are the essentials for the children that care for their physical condition, which is necessary to their mental development, and, to meet this, the architect must arrange for chances to wash, and to exercise both in doors and out, and opportunities for the children to learn order and discipline. In a country that has no compulsory military service the child must learn at school, if at all, the stern and necessary lesson of obedience.

Among the essential exercises is fire drill, which serves the double purpose of teaching order and discipline, and of safeguarding in the best way the lives of the children. As the health of the children is dependent on their being alive to enjoy it, it may not be out of place to outline briefly what seem to be the chief points to be aimed at in the construction and equipment of buildings for the protection of the lives of the children. First, outside doors should open out and be so equipped that they cannot be locked from the inside. Where outside doors are double the standing door should have bolts on the face worked with a handle. Vestibule doors, double swing or swing out, require no locks. Class-room doors — preferably only one in each room, near the teacher's end — may well open out, but this is not essential. Corridors should be fairly wide (not less than eight feet) and free from obstructions. Stairs should be about five feet wide, preferably not wider — with no long runs, and no winders. The building as a whole, and consequently the stairs and corridors,

should, in our cities at least, be fireproof; where this is not possible, then stairs and corridors should be fireproof; when even this is not possible, then at least one stair should be fireproof, and in this case it may possibly be wise to have fireproof doors opening into this stairway and cutting it off from the rest of the building. About this latter there may well be two opinions, and it may be questioned whether an added door to open is offset by the protection against smoke afforded by the complete enclosure. As a fire and the resulting smoke is far more likely to start near the heating apparatus, it is essential that boilers, coal rooms, etc., should be completely surrounded with fireproof material, and openings closed with fireproof doors, and the space vented, so that any smoke could be carried off outside and have no chance of going up into the building. It would be still better, of course, to place the heating apparatus entirely outside the area covered by the school building. . . . Where, as in many of our older cities, there are buildings that have only wooden stairs and corridors, opinion is again divided as to whether any appreciable protection is added if outside fire escapes are installed. The late Fire Commissioner Russell of Boston was of the opinion that perfect fire drill to the regular stairs was the best possible protection, and arguing that in a building full of people, where a fire could not start without being immediately discovered, the children, under good drill, would be out before any serious condition could exist, looked on the fire escapes as a valuable addition for the protection of property and for the use of the firemen, but of no practical use to the children. Some masters also object to having fire drill down the fire escapes — and of course, unless the children were entirely familiar with them, under the ordinary conditions of fire drill, they could not be used in safety under the excitement of a fire. Still public sentiment seems to demand this visible provision for the safety of the children if the ordinary stairs are of wood and liable to fire and smoke.

Again, opinion is divided as to the wisdom of having communicating doors between class-rooms, so that there will be another way besides the corridors of passing from one end of the building to the other. This would mean filing a mass of children under excitement through rooms that are almost completely occupied by fixed furniture. It is more than doubtful whether the added protection is not more likely to prove an added danger. In fireproof buildings it is certainly a defect, for if by any conceivable accident the corridors are full of smoke the children could safely stay in their rooms until the smoke had cleared away. Boston is now systematizing and perfecting the fire drill, and the Schoolhouse Commission are experimenting with a signal which shall work automatically, and which can be rung from any floor, including the basement. The signal for drill is uniform, sounds on special gongs in each corridor and is rung without warning. This apparatus, now being tested in Boston, is connected with fire headquarters and may be so rung as to give the fire drill signal only,

APPENDIX XI.

or both the signal and the alarm at headquarters. In the perfect equipment of the building for fire drill and exit, and the perfect training of the children in prompt response to a fire signal and in orderly departure from the building, lies the safety of the children in case of fire.

I think I have said enough to make it clear that the architect who devotes himself to school planning will have many problems to solve besides those of construction, and that he will be constantly placed in the unenviable position of being obliged himself to decide when experts disagree. All will agree, however, on the main things that are desirable — plenty of space about the building — well kept grounds — a good building as completely fireproof as the resources available will admit — ample light everywhere — an abundance of fresh air — surroundings both in the class-room and outside of it that shall foster an appreciation of what is good and what is lovely, and every possible opportunity for the development of a good healthy mind and body for the child to work with.

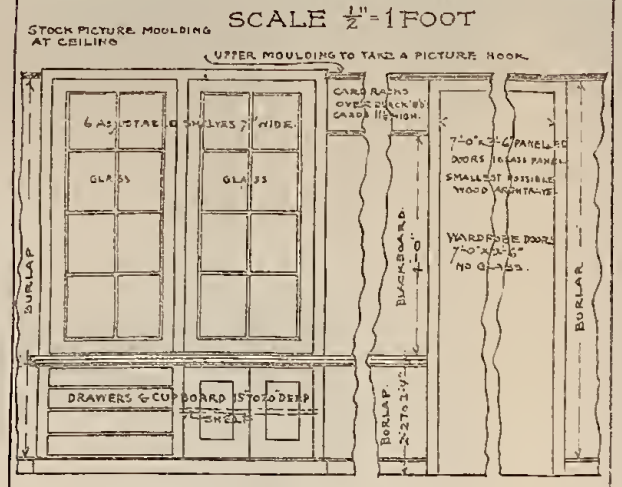
ALLIED PRINTING TRADES UNION LABEL COUNCIL BOSTON, MASS. 21

STANDARDS OF GENERAL DETAIL

CITY OF BOSTON SCHOOLHOUSE DEPARTMENT

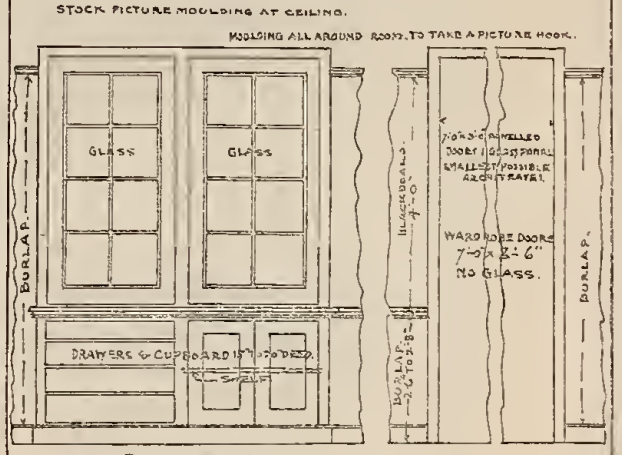
BOOK CASES

SCALE 1/2" = 1 FOOT



BOOK CASES FOR PRIMARY SCHOOLS

ALL DOORS & DRAWERS TO LOCK.

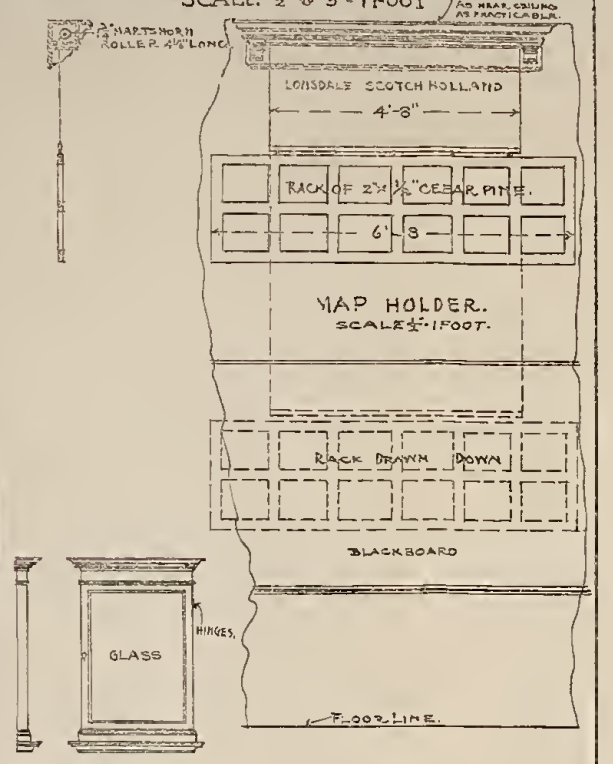


BOOK CASES FOR GRAMMAR SCHOOLS.

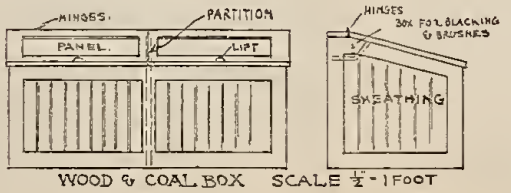
SCALE 0 1 2 3 4 5 6 7 FEET

MAP HOLDER: BULLETIN BOARD ETC

SCALE 1/2" & 3" = 1 FOOT



BULLETIN BOARD
SCALE 1/2" = 1 FOOT.

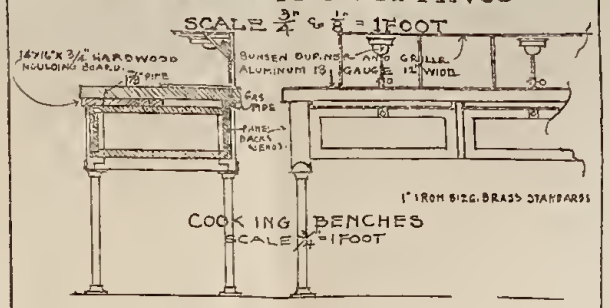


WOOD & COAL BOX SCALE 1/2" = 1 FOOT

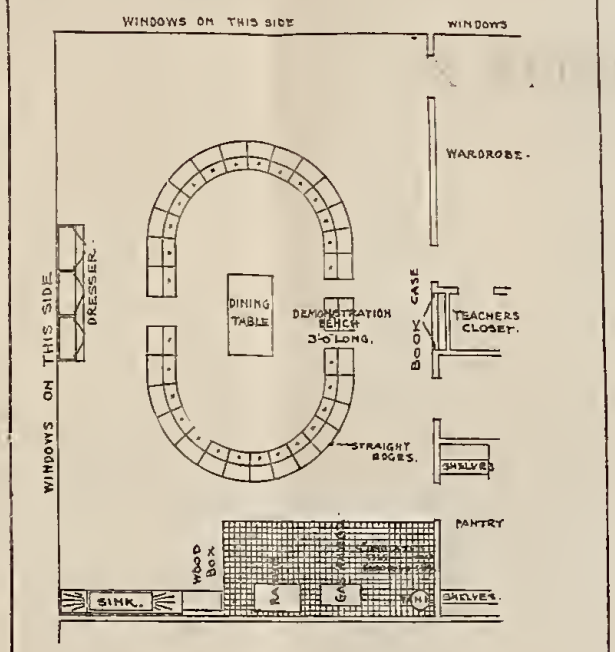
SCALE 0 1 FOOT

COOKING ROOM & FITTINGS

SCALE 3/4" & 1/8" = 1 FOOT



COOKING BENCHES
SCALE 3/4" = 1 FOOT

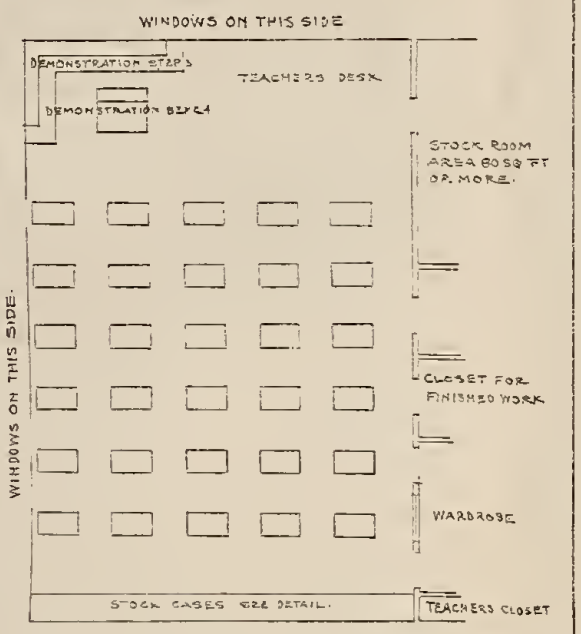


PLAN OF COOKING ROOM
SCALE 1/8" = 1 FOOT.

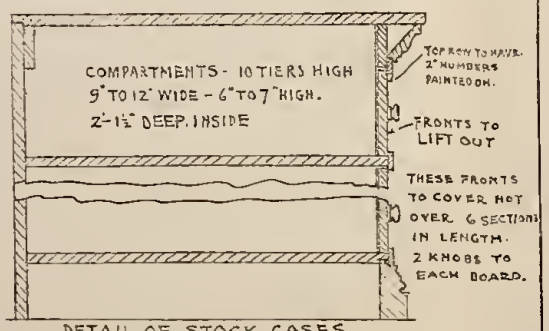
FEET 0 1 2 3
SCALE

MANUAL TRAINING ROOM

SCALE 1 1/2" & 1/8" = 1 FOOT



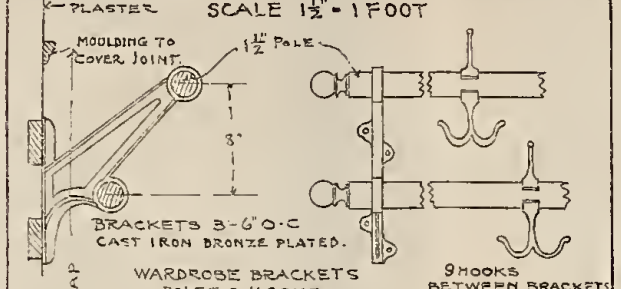
PLAN OF MANUAL TRAINING ROOM SCALE 1/8" = 1 FOOT

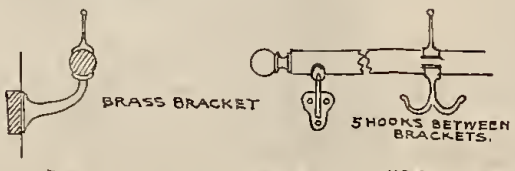


DETAIL OF STOCK CASES.
SCALE 1 1/2" = 1 FOOT.

0 1 2 FEET
SCALE

WARDROBE FITTINGS



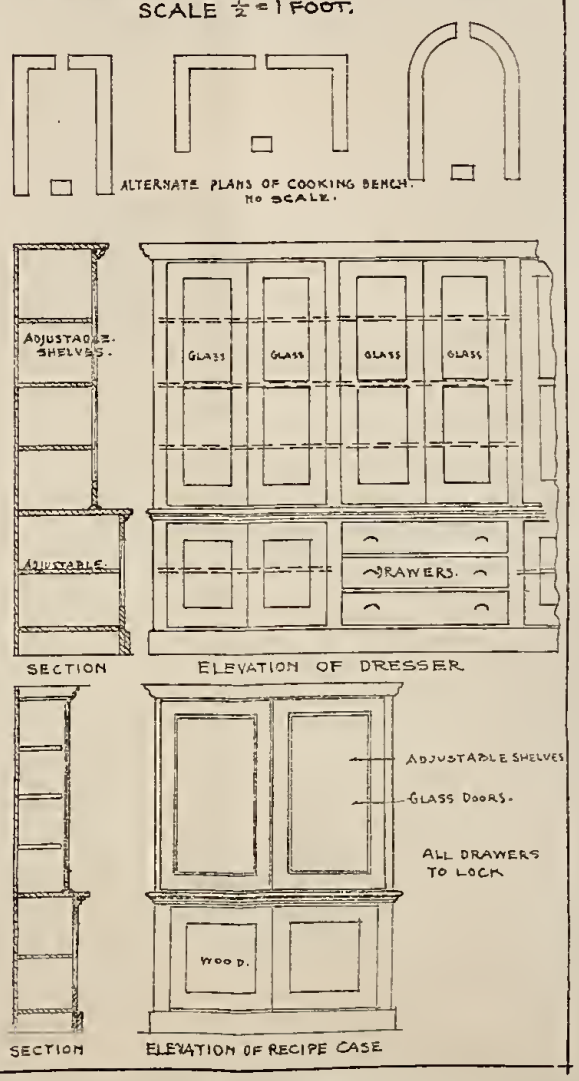


DETAIL OF CLOTHES POLES USED WHEN ALL SIDES OF WARDROBES ARE UTILIZED.

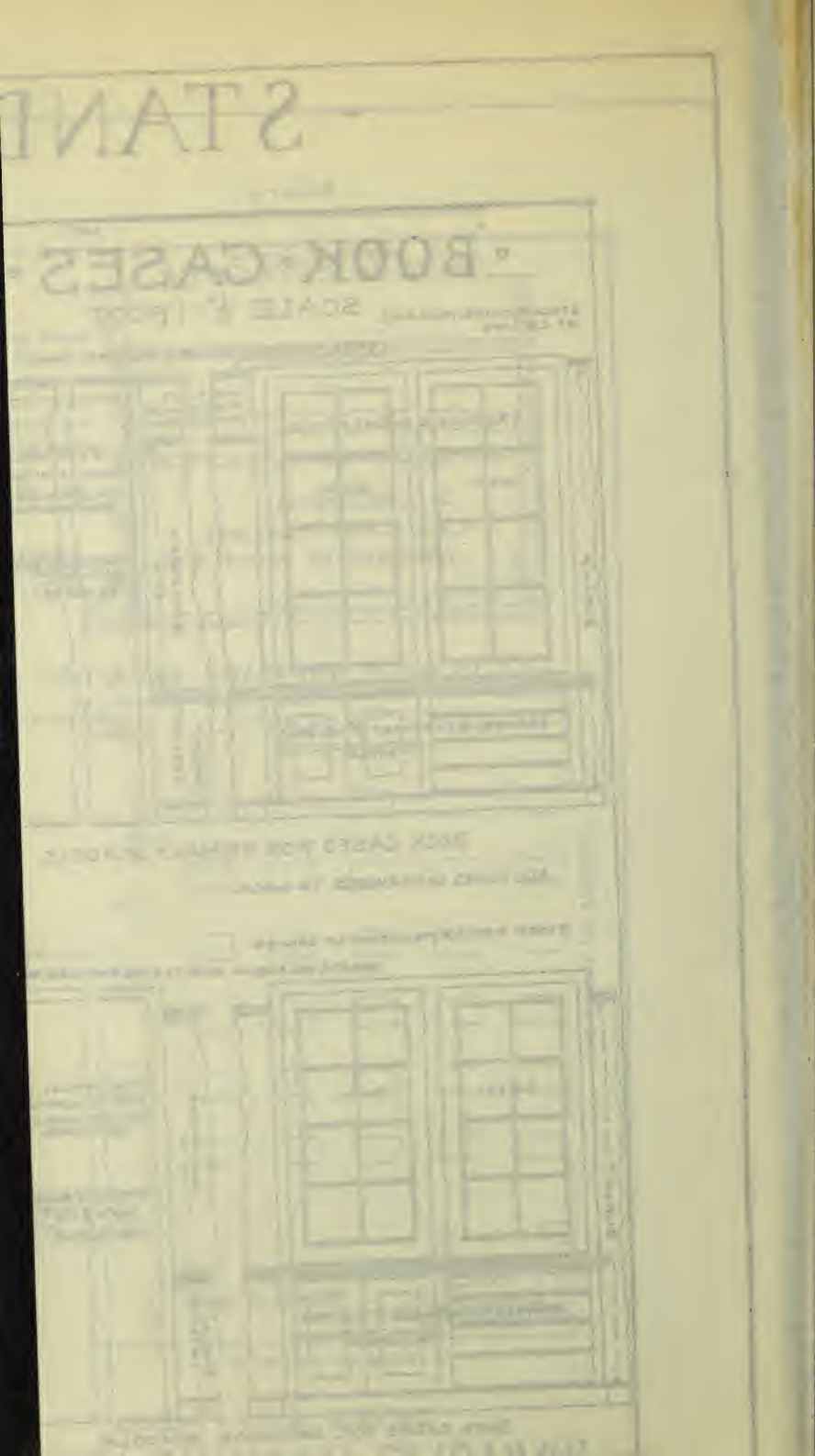
0 1 2 FEET
SCALE

COOKING ROOM FITTINGS

SCALE 1/2" = 1 FOOT.



0 1 2 3 4 FEET
SCALE

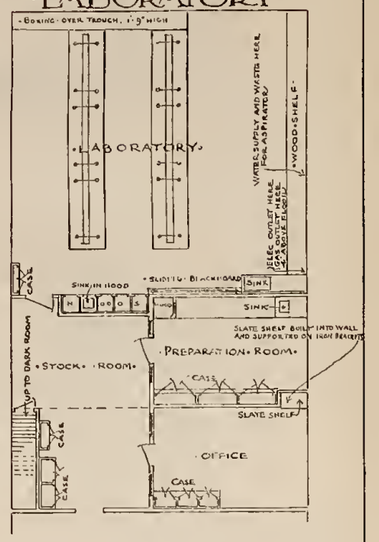


APPENDIX XII.

HIGH SCHOOL STANDARD FITTINGS

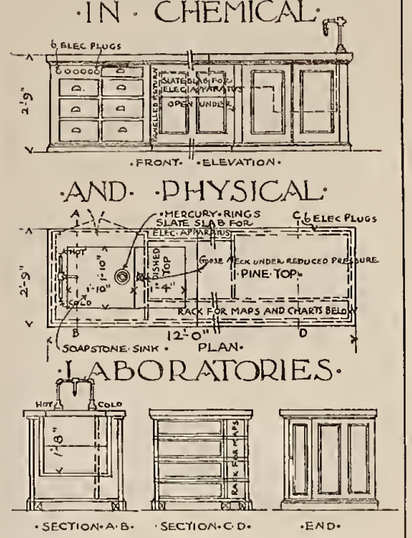
CITY OF BOSTON
SCHOOLHOUSE DEPARTMENT

CHEMICAL LABORATORY

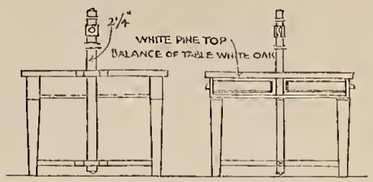


INSTRUCTORS TABLE

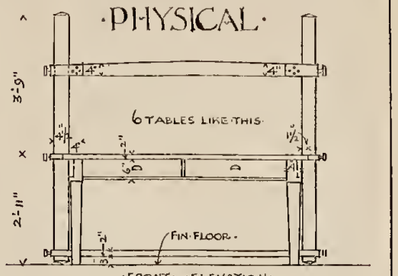
IN CHEMICAL AND PHYSICAL LABORATORIES



PUPILS TABLE



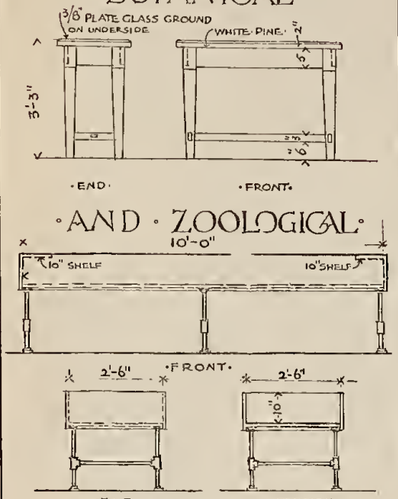
PHYSICAL



LABORATORY

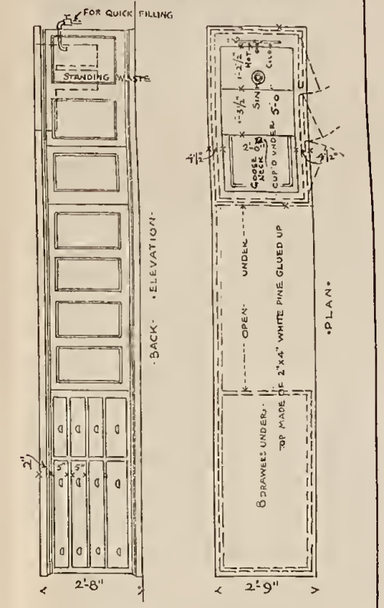
PUPILS TABLE AND MARBLE SINK

BOTANICAL AND ZOOLOGICAL



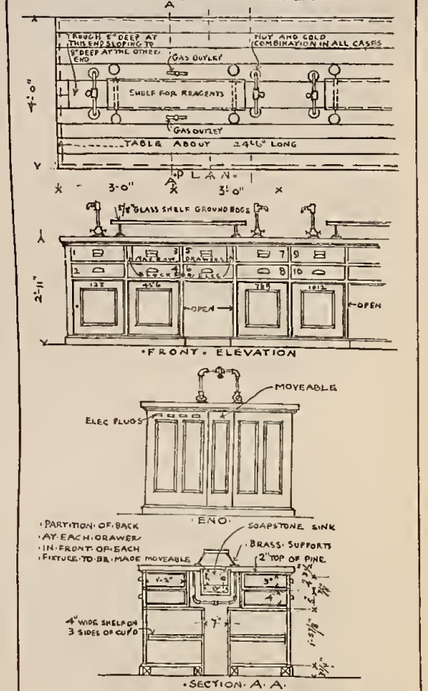
LABORATORY

DEMONSTRATION TABLE



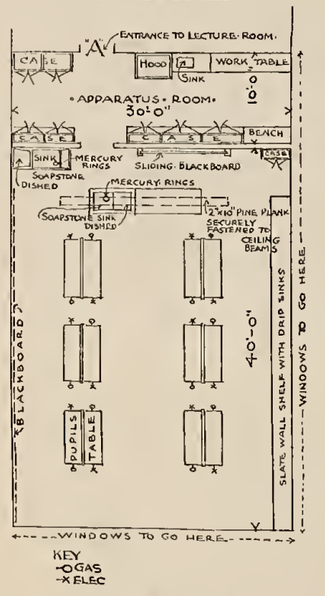
LECTURE ROOM

PUPILS TABLE



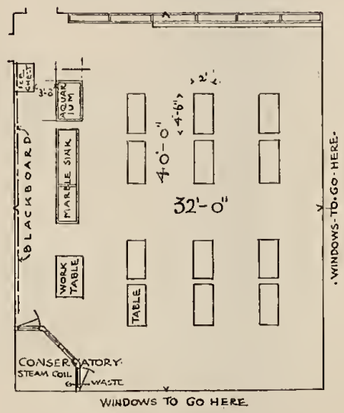
CHEMICAL LABORATORY

PHYSICAL



LABORATORY

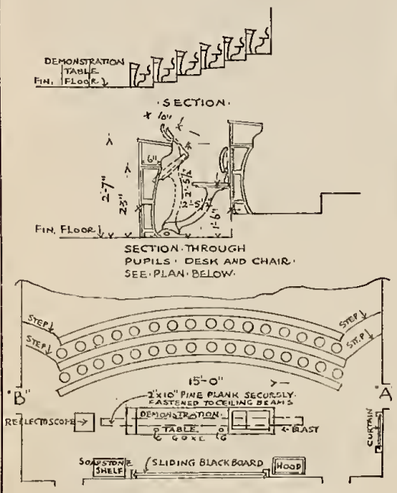
BOTANICAL AND ZOOLOGICAL



LABORATORY

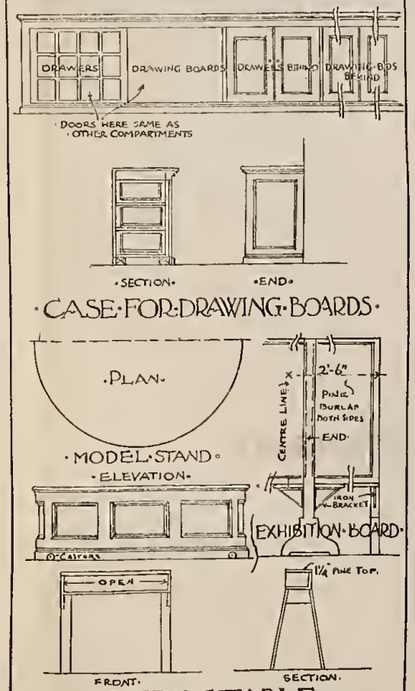
SOUTH EXPOSURE

LECTURE



ROOM

DRAWING ROOM



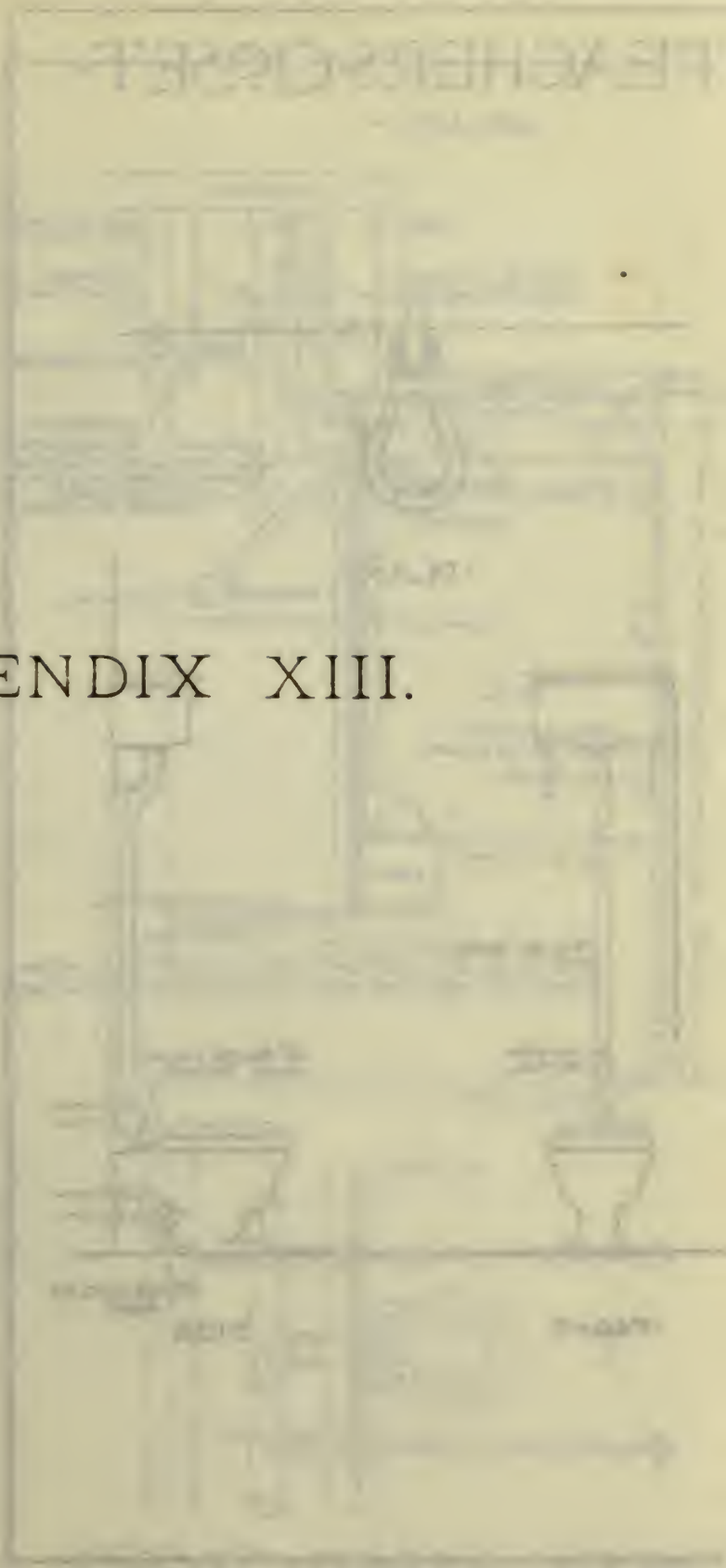
0 5 10 15 20 25 30 FT

SCALE OF PLANS

0 5 10 FT

SCALE OF DETAILS

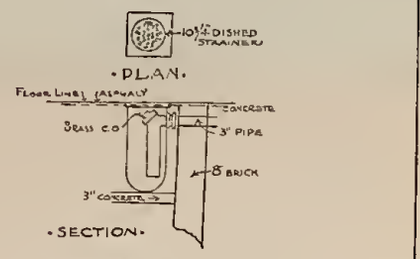
APPENDIX XIII.



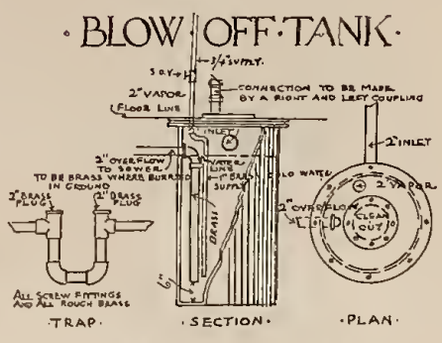
PLUMBING STANDARDS

CITY OF BOSTON
SCHOOLHOUSE DEPARTMENT

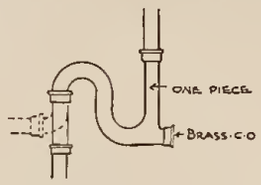
FLOOR WASH



BLOW OFF TANK

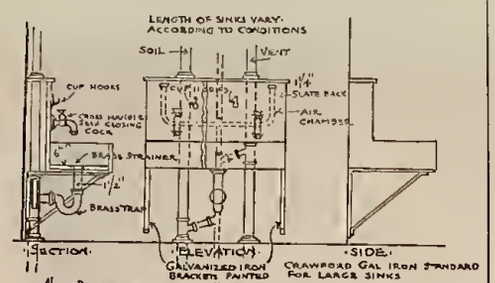


CONDUCTOR TRAP



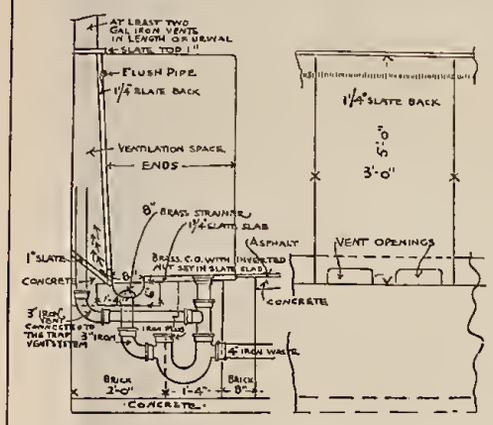
NO TRAP REQUIRED WHERE SEPARATE CONNECTION TO SURFACE DRAINAGE OCCURS.

SLATE SINK

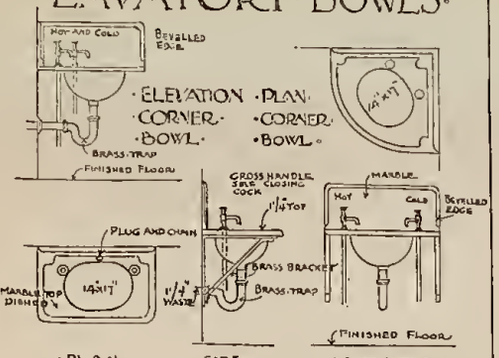


NOTE BRACKETS TO BE PLACED 3'-0" ON SINKS IN BASEMENT SIZE OF SINKS IN BASEMENT TO BE OBTAINED FROM SCHEDULE IN SPECIFICATIONS.

SLATE URINAL

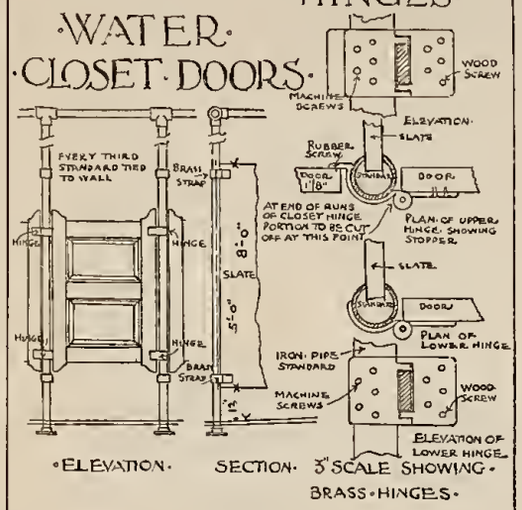


LAVATORY BOWLS

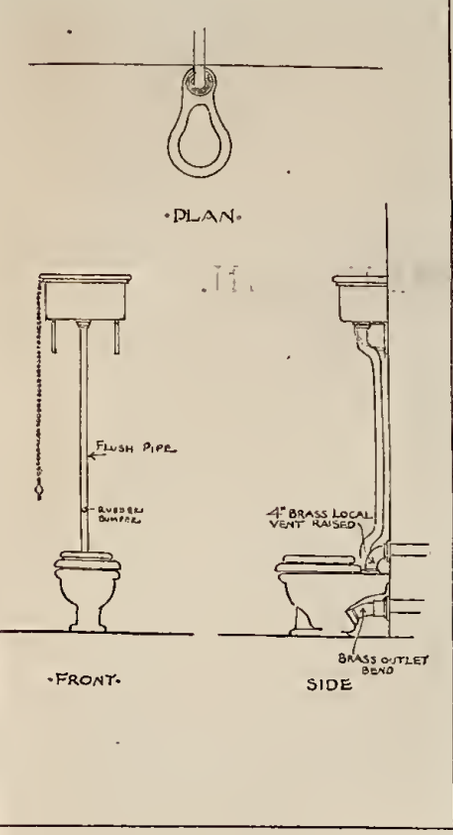


WATER CLOSET DOORS

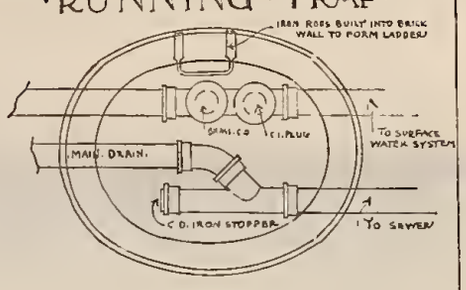
HINGES

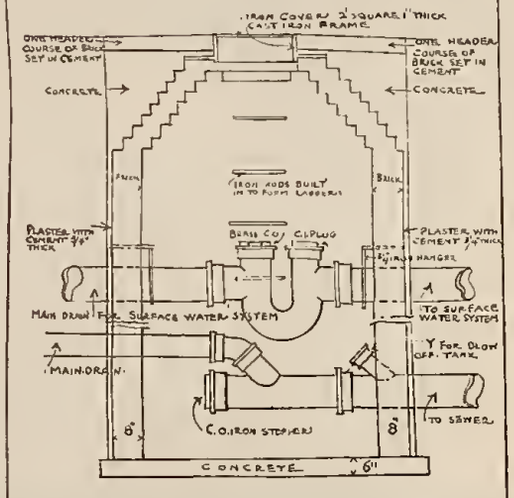


TEACHERS CLOSET

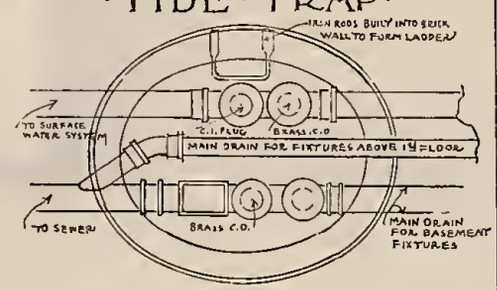


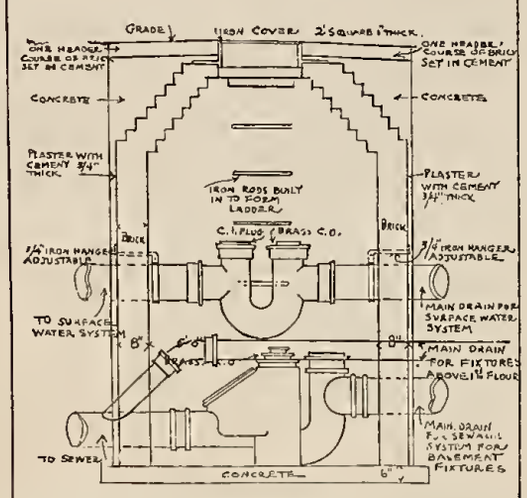
RUNNING TRAP



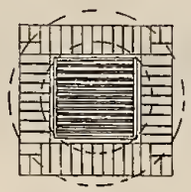


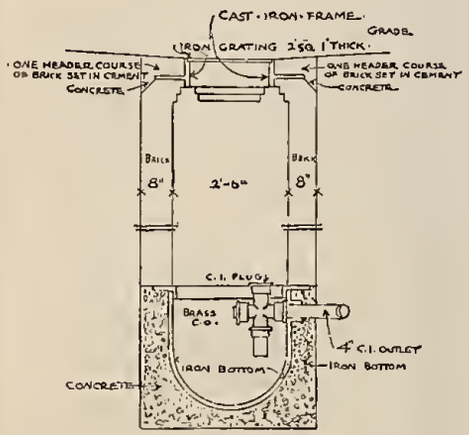
TIDE TRAP



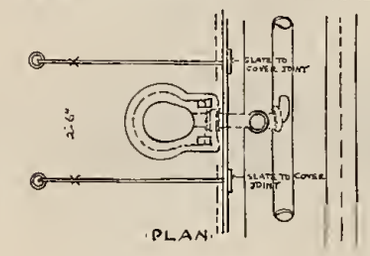


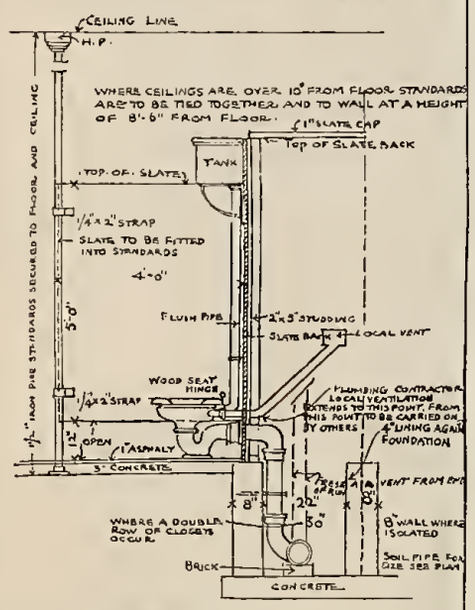
CATCH BASIN





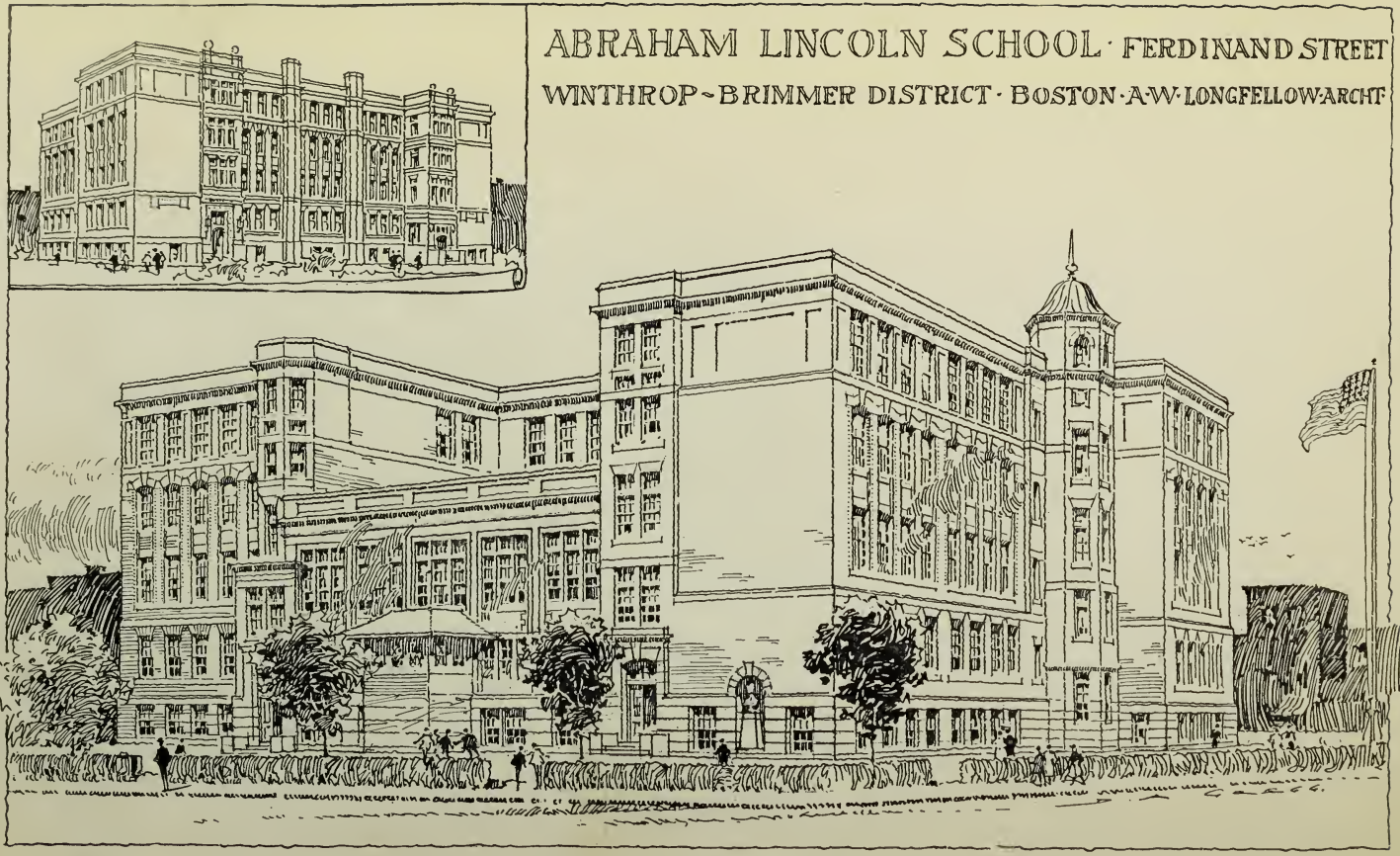
SHORT HOPPER CLOSET





0 5 10 15 20 25 30

SCALE OF PLANS



ABRAHAM LINCOLN SCHOOL, FERDINAND STREET.
A. W. Longfellow, Architect.

For plans see page 75.